Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Mechanical Engineering Programme Code: 1-1408968339			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Manufacturing Processes	ME213	140
2.	Internal Combustion Engine	ME215 (B)	
3.	Manufacturing Technology	ME222	
4.	Power Plant Engineering	ME225 (B)	
5.	Mechanical Workshop-I	ME 226	
6.	Metrology and Mechanical Measurement	ME312	138
7.	Fluid Machinery & Fluid Power	ME315	
8.	Workshop Practices -IV	ME317	
9.	Internal Combustion Engine	ME322	
10.	CAD-CAM & CAE	ME323	
11.	Tool Engineering	ME325	
12.	Workshop Practice –V	ME328	

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Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Mechanical Engineering Programme Code: 1-1408968339			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
13.	Refrigeration and Air Conditioning	ME412	136
14.	Automobile Engineering	ME414 (C)	
15.	Project Work– I	ME416	
16.	Industrial Training	ME417	
17.	Plastic Engineering	ME424 (C)	
18.	Project Work– II	ME425	

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SVERI's
College of Engineering, Pandharpur
Mechanical Engineering Department

Sponsored Project Record

Class: B.E. (Mech.)

A.Y.: 2019-2020

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COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Department of Mechanical Engineering

List of Sponsored Projects

Academic Year: 2019-2020

Sr. No.	Name of Project Student	Name of Project	Name of Project Guide	Name of Industry
1.	Gaikwad Pruthvijit Vasudev Gaikwad Sagar Navnath Phalake Suhas Shrimant Sawant Bhushan Pradyumna	Vibration analysis and fault diagnosis of injection moulding machine	Prof. S. Y. Salunkhe	Pask Industries Pvt. Ltd., Chakan MIDC, Pune
2.	Khaladkar Vyankatesh Yuvraj Ajit S. Jadhav Onkar P. Chidrewar Swami Pranav Vivekanand	Design and Development of the Jig for the Centering and Facing of Round Object	Prof. B. D. Gaikwad	S. G. Gears, MIDC, Tembhurni
3.	Deshmukh Ruturaj Abasaheb Aiwale Prathamesh Babu Chavan Aniket Dnyaneshwar Jadhav Shubham Jayshankar	Effect of vibration on surface quality of part manufactured in injection moulding machine	Prof. S. Y. Salunkhe	Pask Industries Pvt. Ltd., Chakan MIDC, Pune
4.	Chavan Aniket Balasaheb Pore Onkar Gulabrao Patil Pushkar Mahesh Shinde Sudarshan Balasaheb	Design and development of hybrid passenger tricycle	Prof. A. A. Mote	SPARTAN Technologies Pvt. Ltd. Machnur

(Prof. D.T. Kashid)
Project Coordinator

Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur.

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COLLEGE OF ENGINEERING, PANDHARPUR
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Department of Mechanical Engineering

List of Sponsored Projects

Academic Year: 2019-2020

Sr. No.	Name of Project Student	Name of Project	Name of Project Guide	Name of Industry
5.	Bhanvase Amar Maruti Gosavi Vaibhav Digambar Jadhav Rishabh Dnyaneshwar Godase Pavan Vilas	Design and analysis of phase change material Heat Exchanger	Prof. S. J. Shinde	Sitaram Engineering Works, Moshi, Pune-410105
6.	Shete Shivam Sanjay Chavan Nikhil Vijay Bhagwat Rushikesh Manoj Gaikwad Suraj Subhash	Parametric Optimization for PCM of Aluminum Copper	Dr. S. S. Wangikar	Dynamic Lasers, Chikali, Pune
7.	Khadatare Rahul Suresh Pravin Vikram Chavan Wagh Govind R. Atkale Shubhan R.	Design and Development of Mini-belt Grinding Machine	Prof. A. K. Parkhe	Leena Engineering Works, Solapur
8.	Naiknavare Mayur Baburao Popale Ganesh Navanath Landage Balaji Vitthal Charansinha U. Raut	Design and Retrofitting of Hybrid Personal Vehicle.	Prof. S. M. Kale	SPARTAN Technologies Pvt. Ltd. Machnur

(Prof. D.T. Kashid)
Project Coordinator

Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

HEAD.
Dept. of Mechanical Engg
C.O.E. Pandharpur

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Pask Industries

An IATF 16949:2016 Certified Company

Mfg.of Plastic Injection Moulded Components

Plot No. 2, Gat No. 444/4, Village Nighoje, Tal. - Khed, Dist. - Pune, Maharashtra - 410501.
E-mail : info@paskindustries.in, Ph.: 020-65102755.

Ref. Pask/ 210/ 2019-20 Date: 03/09/19

To,
The HOD,
Mech. Dept.
SVERI,s COE Pandharpur.

Sub:- Sponsorship of final year project.

Dear Sir,

With reference to above subject following students from your department has approached our organisation for their final year project.They have identified Problem statement for their final year project as "**Vibration Analysis and Fault Diagnosis of Injection Moulding Machine**" .

Our organisation has provided sponsorship for the said title.

Name of Students:-
1)Pruthvijit Vasudev Gaikwad.
2)Suhas Shrimant Phalake.
3)Sagar Navnath Gaikwad.
4)Bhushan Pradyumna Sawant.
Under the guidance of Prof.S.Y.Salunkhe

Thank You...! .

For PASK,

PASK INDUSTRIES NIGHOJE

S. G. GEARS

MFG. OF : GEAR, GEAR BOXES & PRECISION MACHINED COMPONENTS

HEAD OFFICE : PLOT NO. 35, SECTOR 10, PCNTDA IND. AREA, BEHIND TIMES OF INDIA, BHOSARI, PUNE - 411 026 ☎ 020-66301152
E-mail sggears@gmail.com Web www.sggears.co.in

WORKS : PLOT NO. B-10/1/1, M.I.D.C., TEMBHURNI TAL. MADHA, DIST. SOLAPUR - 413 211

Date :- 20/08/2020

To,
The Principal,
SVERI's College of Engineering.
Pandharpur -413304.

Sub :- Allowing student for sponsorship of project.

Respected Sir,

We are S.G.Gears Tembhurni informing you that we are allowing bellow mentioned students of your college for the sponsorship of one of the project named as " Centering and Facing of the round bar ". We hope that they will give their best in technical as well as practical knowledge to full fill our requirements.

The Name of Students :-

1) Swami Pranav Vivekanand
2) Chidrewar Onkar Pramod
3) Khaladkar Vyankatesh Yuvraj
4) Jadhav Ajit Shankar.

Thank You.
Regards

S.G.Gears, Tembhurni
(Project Manager)

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Pask Industries

An IATF 16949:2016 Certified Company

Mfg.of Plastic Injection Moulded Components

Plot No. 2, Gat No. 444/4, Village Nighoje, Tal. - Khed, Dist. - Pune, Maharashtra - 410501.
E-mail : info@paskindustries.in, Ph.: 020-65102755.

Ref. Pask/111/2019-20 Date: 05/09/19

To,
The HOD,
Mech. Dept.
SVERI,s COE Pandharpur.

Sub:- Sponsorship of final year project.

Dear Sir,

With reference to above subject following students from your department has approached our organisation for their final year project.They have identified Problem statement for their final year project as "**Effect of Vibration on Surface Quality of Part Manufactured in Injection Moulding Machine**" .

Our organisation has provided sponsorship for the said title.

Name of Students:-
1)Shubham Jayshankar Jadhav.
2)Ruturaj Abasaheb Deshmukh.
3)Aniket Dnyaneshwar Chavan.
4)Prathmesh Babu Aiwale.
Under the guidance of Prof.S.Y.Salunkhe

Thank You...! .

For PASK,

PASK INDUSTRIES NIGHOJE

SPARTAN TECHNOLOGIES PVT LTD

(An ISO 9001:2015 Certified Company)

Opposite to Hotel Venktesh,A-Machnur,P-Bramhpuri,Mangalwedha 413305,Dist-Solapur,Maharashtra.M:8806442443

E.mail-spartantechnosltd@gmail.com ,Website-www.spartantechnos.com

Date: 09/03/2020

To,

The Principal,
SVERI's College of Engineering Pandharpur

Subject: Project completion certificate

Respected Sir,

With reference to industry visit of following students from your department to our organization for their final year project, a sponsored project titled **"Design and development of hybrid passenger tricycle"** was offered.

Following students have worked on the project and successfully completed the project as per our requirements.

1. Chavan Aniket Balasaheb (BE Mechanical)
2. Pore Onkar Gulabrao (BE Mechanical)
3. Patil Pushkar Mahesh (BE Mechanical)
4. Shinde Sudarshan Balasaheb (BE Mechanical)

The student's performance during project completion found satisfactory and we wish them all the best for their future.

Thanking you.

Spartan Technologies Pvt.Ltd.
Near Airtel Tower, A/p. Machanur,
Tal. Mangalwedha,
Dist. Solapur - 413 305 (MS)

MR.SURAJ DOKE

M/S DYNAMIC LASER

Mob: 07709281159, Email:- dynamiclazzer@gmail.com

Address:- Gat No. 1402, Sonwane Wasti, Jyotiba Nagar, Chikhali Road, Chikhali, Pune-411062

Date: 09/09/2019

To,

The Head,
Department of Mechanical Engineering,
SVERI's College of Engineering Pandharpur

Subject: Sponsorship for Final Year Project

Dear Sir,

With reference industry visit of Dr. S. S. Wangikar and following students from your department to our organization for their final year project, a sponsored project titled **"Parametric Optimization for PCM of Aluminum Copper"** was offered.

Following students have worked on the project and successfully completed the project as per our requirements.

1. Shete Shivam Sanjay (B.E.-MECH)
2. Chavan Nikhil Vijay (B.E.-MECH)
3. Bhagwat Rushikesh Manoj (B.E.-MECH)
4. Gaikwad Suraj Subhash (B.E.-MECH)

The student's performance during project completion found satisfactory and we wish them all the best for their future.

Thanking you.

For,



M/S DYAMIC LASER

Leena
Engineering Works

Works & Offi.
(0217): 2601501
Resi : 2302010
M : 9403871054
9403871053

Plot No. 156, Industrial Estate,
Hotgi Road, Solapur – 413003
Email – leenaengwks@yahoo.co.in

Ref. No. LEW/2019-20/AUG/27

Date:

Date: 19th August 2019

To,
The Head,
Department of Mechanical Engineering,
SVERI's College of Engineering, Pandharpur.

Subject: Approval of Sponsorship for Final Year Project Work

Dear Sir,

With reference to the above subject, we are approving sponsorship for your following mentioned students for their final year project work. We will be in a role of guide during their project work in our industry. It is expected that they should focus on their project work and complete the same in the stipulated time.

Title of Project- Design and Development of Mini Belt Grinding machine

Name of Students-

1. Mr. Khadatare Rahul S.
2. Mr. Chavan Pravin V.
3. Mr. Wagh Govind R.
4. Mr. Atkale Shubham R.

Name of Project Guide- Prof. Avinash K. Parkhe

Thanking you.

For Leena Engineering Works, Solapur

LEENA ENGINEERING WORKS SOLAPUR

SPARTAN TECHNOLOGIES PVT LTD

(An ISO 9001:2015 Certified Company)

Opposite to Hotel Venktesh,A-Machnur,P-Bramhpuri,Mangalwedha 413305,Dist-Solapur,Maharashtra.M:8806442443

E.mail-spartantechnosltd@gmail.com ,Website-www.spartantechnos.com

Date: 14/03/2020

To,

The Principal,
SVERI's College of Engineering Pandharpur

Subject: Project completion certificate

Respected Sir,

With reference to industry visit of following students from your department to our organization for their final year project, a sponsored project titled **"Design and Retrofitting of Hybrid Personal Vehicle"** was offered.

Following students have worked on the project and successfully completed the project as per our requirements.

1. Naiknavare Mayur Baburao (BE Mechanical)
2. Popale Ganesh Navanath (BE Mechanical)
3. Landage Balaji Vitthal (BE Mechanical)
4. Charansinha U. Raut (BE Mechanical)

The student's performance during project completion found satisfactory and we wish them all the best for their future.

Thanking you.

Spartan Technologies Pvt.Ltd.
Near Airtel Tower, A/p. Machanur,
Tal. Mangalwedha,
Dist. Solapur - 413 305 (MS)

MR.SURAJ DOKE

.

SVERI's
College of Engineering, Pandharpur

Mechanical Engineering Department

Industrial Training/ Internship

Record

A.Y.: 2019-2020

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Department of Mechanical Engineering

List of Students those who have completed their Industrial Training / Internship

Academic Year: 2019-2020

Sr. No.	Roll No	Name of Student	Name of Company / Organization / Industry	Duration of Internship/Industrial Training
1.	TA 02	Shraddha dattatray Gajakosh	Precision Camshaft Limited, Solapur	11/12/2020 to 18/12/2020
			AFour Technologies Pvt Ltd Pune	10/05/2020 to 26/09/2020
2.	TA 03	Gayatri Vinayak Joshi	Smart Knower	01/11/2020 to 31/12/2020
			Precision Camshaft Limited, Solapur	11/12/2020 to 18/12/2020
3.	TA 07	Namrata Parvat	AFour Technologies Pvt Ltd Pune	28/05/2020 to 28/07/2020
			Techfest, IIT Bombay	01/07/2020 to 31/01/2021
4.	TA 25	Yash Gadekar	Intech Olympiad COEP Pune	28/05/2020 to 28/08/2020
			Precision Camshaft Limited, Solapur	11/12/2020 to 18/12/2020
5.	TA 55	Prajwal Dattatraya Musale	Precision Camshaft Limited, Solapur	11/12/2020 18/12/2020
6.	TB 03	Arati Lale	AFour Technologies Pvt Ltd Pune	28/05/2020 to 28/07/2020
7.	TB 05	Vaishali Dilip More	Wayup, Gate No. 89,Bhavya Enterprises, Makhadumpur, Digha, Patana-11	01/10/2020 to 30/10/2020
8.	TB 34	Patil Madan Kalyan	AFour Technologies Pvt Ltd Pune	28/05/2020 to 28/07/2020
9.	TB 56	Akash Prasad Ajgar	AFour Technologies Pvt Ltd Pune	28/05/2020 to 28/07/2020

(Dr. S. S. Wangikar)
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur.

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meets Performance

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+91 9168646531/32/33
L24231PN1992PLC067126

Date - Friday, December 25, 2020

CERTIFICATE FOR INDUSTRIAL EXPOSURE TRAINING

Name	Shraddha Dattatray Gajakosh
Qualification	B.Tech (Mechanical) III
Name of the College	SVERI College of Engineering,Pandharpur
Type of Training	Industrial Exposure Training
Period of Training	**11/12/2020 To 18/12/2020**
Nature of Training	During her training period she has undergone orientation training in different Manufacturing Process, Tool Room, Industrial Engineering, Engineering Services, Quality Assurance, HR Dept. etc.

During the training period, her attendance and performance was satisfactory.We wish her bright future.

For Precision Camshafts Limited

R K Kashid
General Manager – HR

PRECISION CAMSHAFTS LTD. SOLAPUR

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INTECH OLYMPIAD
ONLINE SUMMER INTERNSHIP
CERTIFICATE

This is to certify that

Mr /Mrs / Ms **Shraddha Gajakosh**
from **SVERI's COE Pandhrpur**
participated and successfully completed the project " **Propose a Delivery system within city limits without human interaction with customer. OR Develop drone delivery system overcoming current challenges** " assigned in InTech Olympiad during Online Summer internship from 28th May 2020 to 28th july 2020

Mr. Mahesh A. Kulkarni
AFour Technologies

Prof. Sudhir D. Agashe
COEP

AFOUR TECHNOLOGIES

smartknower
STAY AHEAD OF THE CURVE

CERTIFICATE
OF INTERNSHIP

Best AWARD

THIS CERTIFICATE IS PROUDLY PRESENTED TO:

Gayatri Vinayak Joshi

Has successfully completed Internship On Robotics
from 01-11-2020 to 31-12-2020. During his/her internship,
the student was found to be dedicated, hardworking and intelligent

21-01-2021
DATE

P. Naveen
Academic Head

Certificate ID: 540365648

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+91 9168646531/32/33
L24231PN1992PLC067126

Date - Friday, December 25, 2020

CERTIFICATE FOR INDUSTRIAL EXPOSURE TRAINING

Name	Gayatri Vinayak Joshi
Qualification	B.Tech (Mechanical) III
Name of the College	SVERI College of Engineering,Pandharpur
Type of Training	Industrial Exposure Training
Period of Training	**11/12/2020 To 18/12/2020**
Nature of Training	During her training period she has undergone orientation training in different Manufacturing Process, Tool Room, Industrial Engineering, Engineering Services, Quality Assurance, HR Dept. etc.

During the training period, her attendance and performance was satisfactory. We wish her bright future.

For Precision Camshafts Limited

PRECISION CAMSHAFTS SOLAPUR

R K Kashid
General Manager – HR

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CERTIFICATE

This is to certify that

Mr /Mrs / Ms **Namrata Parvat**
from **SVERI'S COLLEGE OF ENGINEERING PANDHARPUR**
participated and successfully completed the project " **Enforcement of Social distancing at any service provider at point of sale/service like shops/malls/Theatres/Ticket Booking Windows/Restaurants etc** " assigned in InTech Olympiad during Online Summer internship from 28th May 2020 to 28th july 2020

Mr. Mahesh A. Kulkarni
AFour Technologies

Prof. Sudhir D. Agashe
COEP

AFOUR TECHNOLOGIES

September 7th, 2020

InTech Olympiad
Online Summer internship
Letter of Recommendation

To Whom It May Concern

I have known Namrata Parvat for last three month, since the beginning of her virtual internship with InTech Olympiad. During the internship, Namrata worked as a Member of a Team with a group assignment on *"Social Distancing at any service provider at point of sale / service"*.

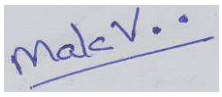
This was a remote assignment during which the Team Members at different & distant locations collaborated *on-line* for arriving at the subject Road Map.

I, the undersigned, mentored the team on behalf of InTech Olympiad, an Organization in Pune conducting various experiments to identify and bridge the gap in Industry's expectations regarding Skills available with Fresh Graduate Engineers. During this Internship, as a Mentor, I interacted with the Team as well as Individuals frequently, during routine and periodic progress review meetings.

During the interactions, I noted Namrata with abilities in terms of learning the user interface design process and making prototype of the solution.

I highly recommend Namrata for her team spirit specifically for career opportunities user interface design and development. I note her team interaction skills with special emphasis.

With Warm Regards



Mentor, Intech Olympiad

Makarand Vaidya
Founder Director
CoreView Systems Private Limited
Email: makarand.vaidya@coreviewsystems.com

Techfest™
Asia's Largest Science & Technology Festival

CERTIFICATE OF APPRECIATION

This certificate is awarded to

Namrata Parvat

for successfully completing **Social Media Marketing Internship**

as a **College Ambassador** of Techfest, IIT Bombay

with a **GOLD** medal.

Prof. R.S. Pant
Faculty Advisor
Techfest, IIT Bombay

Bhuvanesh Gupta
Overall Coordinator
Techfest 2020-21

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CERTIFICATE

This is to certify that

Mr /Mrs / Ms **Yash Gadekar**
from **SVERI's COE Pandhrpur**
participated and successfully completed the project " **Propose a Delivery system within city limits without human interaction with customer. OR Develop drone delivery system overcoming current challenges** " assigned in InTech Olympiad during Online Summer internship from 28th May 2020 to 28th july 2020

Mr. Mahesh A. Kulkarni
AFour Technologies

Prof. Sudhir D. Agashe
COEP

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+91 9168646531/32/33
L24231PN1992PLC067126

Date - Friday, June 25, 2020

CERTIFICATE FOR INDUSTRIAL EXPOSURE TRAINING

Name	Yash Yuvraj Gadekar
Qualification	B.Tech (Mechanical) III
Name of the College	SVERI College of Engineering, Pandharpur
Type of Training	Industrial Exposure Training
Period of Training	**11/12/2020 To 18/12/2020**
Nature of Training	During his training period he has undergone orientation training in different Manufacturing Process, Tool Room, Industrial Engineering, Engineering Services, Quality Assurance, HR Dept. etc.

During the training period, his attendance and performance was satisfactory. We wish him bright future.

For Precision Camshafts Limited

R K Kashid
General Manager – HR

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meets **Performance**

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+91 9168646531/32/33
L24231PN1992PLC067126

Date - Friday, June 25, 2020

CERTIFICATE FOR INDUSTRIAL EXPOSURE TRAINING

Name	Prajwal Dattatray Musale
Qualification	B.Tech (Mechanical) III
Name of the College	SVERI College of Engineering, Pandharpur
Type of Training	Industrial Exposure Training
Period of Training	**11/12/2020 To 18/12/2020**
Nature of Training	During his training period he has undergone orientation training in different Manufacturing Process, Tool Room, Industrial Engineering, Engineering Services, Quality Assurance, HR Dept. etc.

During the training period, his attendance and performance was satisfactory. We wish him bright future.

For Precision Camshafts Limited

R K Kashid
General Manager – HR

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INTECH OLYMPIAD
ONLINE SUMMER INTERNSHIP
CERTIFICATE

This is to certify that

Mr /Mrs / Ms **Arati Lale**
from **SVERI'S COLLEGE OF ENGINEERING PANDHARPUR**
participated and successfully completed the project " **Achieve Effective Online / Remote / Distance education in Rural areas considering limited resources - With Unsupervised learning and Eval and assessment frame work** " assigned in InTech Olympiad during Online Summer internship from 28th May 2020 to 28th july 2020

Mr. Mahesh A. Kulkarni
AFour Technologies

Prof. Sudhir D. Agashe
COEP

AFOUR TECHNOLOGIES

UDYOG Aadhar : BR26D0067761

Date : 16.12.2020
Ref no.: WayupX135

To whom it may concern,

This is to certify that Ms. Vaishali Dilip More of SVERI's college of engeenering, Pandharpur has successfully completed 28Days Internship programme in Social Media Marketing and has completed her tasks with perfection. During the period of her internship programme with us she was found punctual, hardworking and inquisitive.
We wish her every success in life.

From Wayup

Abhishek Raj

Abhishek Raj

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INTECH OLYMPIAD
ONLINE SUMMER INTERNSHIP
CERTIFICATE

This is to certify that

Mr /Mrs / Ms **Madan Patil**
from **SVERI's College of Engineering, Pandharpur**
participated and successfully completed the project " **Low cost Automation Project in industry driven by Covid 19 Social Discipline** " assigned in InTech Olympiad during Online Summer internship from 28th May 2020 to 28th july 2020

Mr. Mahesh A. Kulkarni
AFour Technologies

Prof. Sudhir D. Agashe
COEP

AFOUR TECHNOLOGIES

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This is to certify that

Mr /Mrs / Ms **Akash Ajgar**
from **SVERI's COE Pandhrpur**
participated and successfully completed the project **" Propose a Delivery system within city limits without human interaction with customer. OR Develop drone delivery system overcoming current challenges "** assigned in InTech Olympiad during Online Summer internship from 28th May 2020 to 28th july 2020

Mr. Mahesh A. Kulkarni
Abour Technologies

Prof. Sudhir D. Agasha
COEP

AFOUR TECHNOLOGIES

SVERI'S COLLEGE OF ENGG., PANDHARPUR.

DEPARTMENT OF MECHANICAL ENGINEERING.

INDUSTRIAL EXPOSURE TRAINING REPORT

Submitted By

NAME: Shraddha Dattatray Gajakosh

CLASS: B.Tech(Third year)

DATE: 11/12/2020- 18/12/2020

ROLL NO: A02

DEPARTMENT OF MECHANICAL ENGINEERING

SVERI'S COLLEGE OF ENGG,

PANDHARPUR-413304

A

INDUSTRIAL EXPOSURE TRAINING

Conducted at



"PRECISION CAMSHAFTS LIMITED, SOLAPUR.

Submitted By

Miss.Shraddha Dattatray Gajakosh

T.Y.(Mech Engg)

Roll no: A02

Under the guidance of

Prof. Kuldeep S. Pukale

SVERI's College of Engg,

Pandharpur.

CERTIFICATE OF APPROVAL BY EXAMINERS

This is to certify that Industrial exposure training has been

Completed by Miss. Shraddha Dattatray Gajakosh (T.Y.Mechanical, Div-A, Roll no-02) at **PRECISION CAMSHAFTS LIMITED,SOLAPUR** during **11/12/2020** to **18/12/2020** is a bonafide work in the partial fulfilment for the award of the degree of **Bachelor of Technology(Mechanical Engineering)**

as prescribed by the Punyashlok Ahilyadevi Holkar Solapur University.

Dr.Sandip S. Wangikar

Head of Mech Dept,

SVERI's Coe pandharpur.

where Passion
meets Performance

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Date - Friday, December 25, 2020

CERTIFICATE FOR INDUSTRIAL EXPOSURE TRAINING

Name	Shraddha Dattatray Gajakosh
Qualification	B.Tech (Mechanical) III
Name of the College	SVERI College of Engineering,Pandharpur
Type of Training	Industrial Exposure Training
Period of Training	11/12/2020 To 18/12/2020
Nature of Training	During her training period she has undergone orientation training in different Manufacturing Process, Tool Room, Industrial Engineering, Engineering Services, Quality Assurance, HR Dept. etc.

During the training period, her attendance and performance was satisfactory. We wish her bright future.

For Precision Camshafts Limited

R K Kashid
General Manager – HR

PRECISION CAMSHAFTS LTD. SOLAPUR

INTRODUCTION

As a part of internship program for B.Tech student, I had my vocational training with PRECISION CAMSHAFTS LIMITED Based in Chincholi MIDC Solapur. It is well known company which manufactures camshafts.

A camshaft on an internal combustion heat engine is a device that controls the both the input of fuel and the expulsion of exhaust fumes. It consists of several radial cams, each displacing intake or exhaust valves.

The machining of the casted camshafts is difficult process if we go by manual operations due to this the machining of casted camshafts is mostly done on computerized machines.

PRECISION CAMSHAFTS LIMITED is Asia's leading company and has created monopoly in manufacturing of camshafts. Company is able to produce 150 varieties of camshafts for car engines, tractor and locomotive engines according to customer requirement.

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HISTORY OF THE COMPANY

Since its incorporation in 1992, PCL has emerged as one of the market leaders in the camshaft manufacturing.

Let's look at the timeline of the company to have better look at their development.

COMPANY OVERVIEW OUR EVALUATION

- 1992 :-1)Incorporation of PCL.

  2)Started with supply of 600 camshafts /month.

- 1997 :-1) Investment by private equity investor CDC.

  2)expansion of machine shop and foundry capacity.

- 1999:-1)Technical and financial JV with G. Clancey Limited,UK European camshaft manufacturer.
- 2006:- 1)Acquistition og G.Clancey Limited stake in JV.
- 2008:-1)Tata capital invests in PCL by purchasing shares from CDC.
- 2011:-1)Incorporation of 100% owned subsidiary 'PCL Company Limited' in China.
- 2012:-JV with shenglong Automotive Powertrain Company China for camshaft manufacturing.
- 2013:- JV with shenglong Automotive Powertrain Company China for Setting up foundry unit.
- 2014:- Exclusive agreement with EMAG ,German tooling and machining company.
- 2016:-Listing on BSE and NSE with a successful IPO raising – Rs0240 cr fresh issue- Rs 170.2 cr offer for sale.

BOARD OF MEMBERS

- **Mr.YATIN SHAHA**(CHAIRMAN & MANAGING DIRECTOR):
  Mr. Yatin Shah is the founder and Managing Director of Precision Camshafts Limited. Leading a group of over 2000 employees, Mr. Yatin Shah has been the strategist and mind behind the vision called Precision.

- **Dr.SUHASINI SHAHA**(Non-Executive Director, PCL)
  Dr. Suhasini Shah heads the legal department at Precision Camshafts Limited and is the founder trustee of the Precision Foundation.

- **Mr.RAVINDRA JOSHI**(DIRECTOR & CFO**)**
  Mr. Ravindra Joshi has 27 years of experience with expertise in the areas of finance and accounting, mergers and acquisition, managing revenue, profitability and maintaining and contributing to the financial health of the organization

- **Mr.KARAN SHAHA**(Whole time direcror business Development**)**
  An MBA (Masters in Business Administration) from Harvard Business School, Boston USA (May 2016) and a Bachelor of Science in Mechanical Engineering from Purdue University, West Lafayette, USA (August 2012), Mr. Karan Shah has 2 years' experience as a manufacturing engineer at Cummins, USA. He joined PCL as an Executive - Business Development in February 2017 and has played a key role in the Company's recent acquisitions, Motoren und Fahrzeugtechnik GmbH (MFT), Germany and Emoss Mobile Systems B.V., Netherlands.

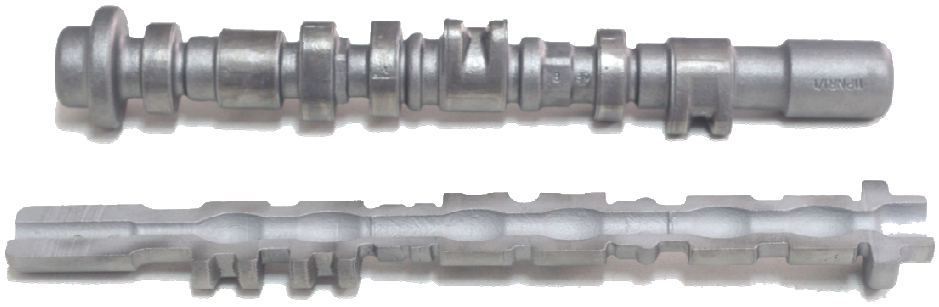
- **INDEPENDENT DIRECTOR**

  1)Mr.Sarvesh joshi
  2)Mr.Pramod mehendale
  3)Mr.Vedant Pujari
  4)Mr.Vaibhav mahajani
  5)Mrs.Savani Laddha

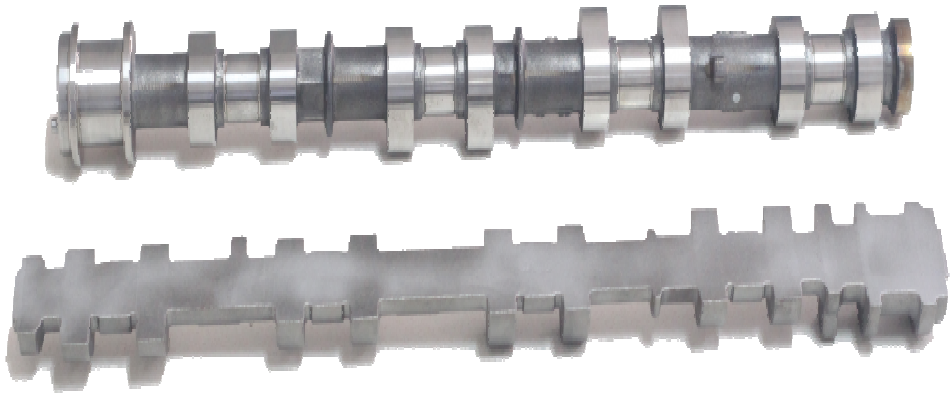
PRODUCTS

1)CHILLED CAST IRON

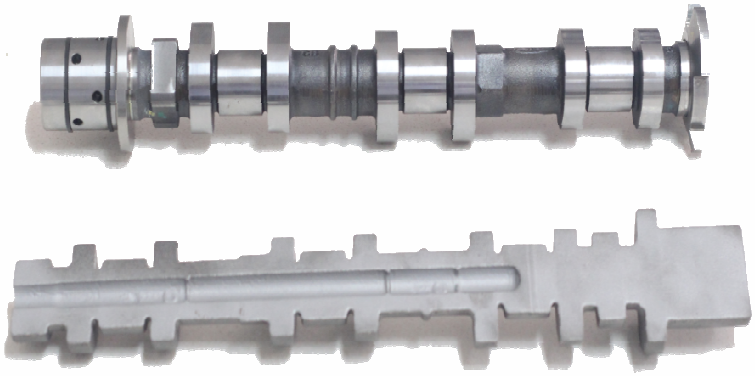
The automotive industry demands valve-train components that work well at high stress and offer low wear resistance at marginal lubrication. They also want these components at a low cost, with improved emissions, and guaranteed high-performance materials behaviour, together with a robust and proven manufacturing technology. PCL has been meeting these requirements in the American, European, and Asian markets, including the Indian Subcontinent and Japan. PCL today manufactures fully machined and as cast camshafts as per customer requirement for SOHC, DOHC, V6 & V8 engines with VCT or Non VCT application.



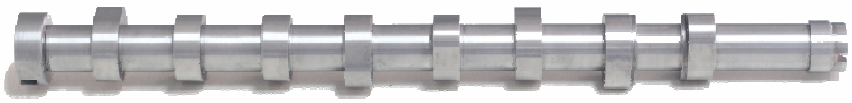
2) DUCTILE CAST IRON CAMSHAFTS



3) HYBRID CAMSHAFTS



4) ASSEMBLED CAMSHAFT



VARIOUS DEPARTMENTS

The precision Camshafts at Chincholi MIDC have 4 foundries and 3 machine shops. The working and functioning of each section and internal departments is given below.

FOUNDRIES:-

- Total 4 foundries named as F1, F2, F3, and F4. The process is same at each foundry . Following steps are performed to manufacture a camshaft.
- The mould is also made in foundry which takes cycle time of 3 min. The baked mould is passed over conveyors and it goes for pouring process.
- The raw materials along with important alloys is measured and mixed and melted in furnaces at temperature 1530 degree Celsius.
- There are proper overhead cranes for proper transfer of materials.
- The molten metal is poured through ladle into the sand castings which has the shape of camshafts to be obtained after solidifying.
- After solidifying camshafts , they are go for finishing process such as shot blasting , grinding process in 3 stages etc. for removal of particles on the surface of camshafts
- After finishing process , camshafts goes for hardness check , inspection and quality check
- There are two procedures while exporting the camshafts, for some companies they send the camshafts after inspection without finishing operations on them or few companies demand the fully finished camshafts, machining on them is done in machine shops.

- The total manufacturing capacity is 13.38 million camshaft casting per annum





MACHINE SHOPS:-

- There are total of 3 machine shops, out of which 2 are running in full capacity, and M3 is proposed to be the biggest machine shop.
- Most of the machines there are automated CNC machines, with fixed programs and fixed machining time.
- There is complete line, at the start of which is casted camshaft and at the end camshaft is packed and is ready for export.
- Quality of the machining is checked at every start and end of a shift.
- The specialization in 3 and 4 cylinder chilled cast iron camshafts, with machining capacity to produce over 2.22 million camshafts per annually.





INESPECTION DEPT:-

- Ready castings are tested by some tests. These tests include spectrometer test, hardness tester, run-out fixture, dimensional inspection. After all these tests the “ok” camshafts are packed and dispatched.
- All camshafts are checked for their sizes and shapes by using different types of gauges and instrument and camshafts for rework are separated that from others.

R & D DEPTARTEMENT:-

- Since precision camshaft is large scale and ever expanding company, it becomes very necessary for them to continually do the research and refine the processes, reduce the defects, manage the inventory in proper way.
- Other parameters like cost saving, time saving etc. are researched.

MAINTENANCE DEPT:

- The various types of machines require routine checkups and maintenance and record are kept every time a maintenance is carried out.

H.R.DEPARTMENT:-

- The H.R. Department provides everything when it comes to employee benefits such as health insurance, retirement's benefits, transportation, dining area etc.
- PCL equipped with strong WIFI, the training rooms, to promote the values and intelligence of employees.
- Training programs are specifically designed for employee to help them to increase their efficiency and productivity.



CLIENT LIST

The precision camshafts provides camshafts to the following companies,

- FORD MOTORS
- TATA MOTORS
- MAHINDRA
- FIAT
- MARUTI SUZUKI
- GM
- MERCEDES BENZ
- INDIAN RAILWAYS
- HYUNDAI
- FORCE MOTORS
- MAHALE
- ESCORTS
- VOLKSVAGON







Mercedes-Benz









PLANT LAYOUT



LEARNING AREAS

The following are the things we learnt from our 7 days internship program:-

1. We got to see the processes which we learnt in our manufacturing process subject.
2. We got to see how all the processes are managed and cross flow is avoided to save precious time.
3. We learnt more about management of man power, how workers, managers, supervisors are treated
4. The most important thing from my perspective we learnt was about the discipline that shown all over the place, from workers entering and leaving in the lines, neatness and cleanliness of environment to the strict rules and regulations which are strictly followed.

CASE STUDY

FINISHING PROCESSES AFTER CASTING

Cleaning of Castings After the solidification of the casting, the mould is knocked out and solidified casting is taken out of the moulding sand. At this juncture the cast product is attached with risers, and gates. many times the moulding sand also get adhered to the casting as some of the sand gets fused with the molten metal. The cleaning of castings refers to the removal of gates, risers and sand. Also, cleaning may involve machining or abrasive finishing of the cast product. The cleaning operations usually performed on a casting are given below:

1. Removal of gates, in-gates, riser, feeder etc.
2. Surface cleaning
3. Trimming

There are various methods of removal of unwanted metallic parts from the solidified cast product in case of brittle material, the gates, risers, and feeder can be removed by impact force. This is usually done in shakeout or knocks out devices. Other processes that may be used to cut off the metallic parts include, band saws, grinding machine, shearing machine, cutting torches, etc.

There are various methods of removal of unwanted metallic parts from the solidified cast product in case of brittle material, the gates,

risers, and feeder can be removed by impact force. This is usually done in shakeout or knocks out devices. Other processes that may be used to cut off the metallic parts include, band saws, grinding machine, shearing machine, cutting torches, etc.

Shot blasting is commonly used for:

The cleaning of iron, steel, non-cast parts, forgings, etc.

Mechanical cleaning of sheets, rods, coils, wire, etc.

Shot peening to alter mechanical properties (increasing resistance to fatigue for springs, gears, etc.)

CONCLUSION

From 7 days of industrial exposure training at precision camshafts, following points were concluded:-

1. I understand the different foundry and machining processes working efficiently in company.
2. The training at PCL for period of 7 days helped me for clarifying the concept about industrial organization and its functioning.
3. This training shows the importance of practical knowledge of various manufacturing process such as casting, fettling, cam grinding, hardening etc.
4. I saw the various types of material handling equipment's such as conveyor, chain, conveyor, trolley, fork lift trucks etc.
5. I have learned the company culture, discipline, environment and rules and regulations of company.
6. At the PCL, I have learnt about the implementation of theory in practice and also show that there are some difference in actual practice and theory

SVERI's
College of Engineering, Pandharpur
Mechanical Engineering Department

Project Work-I & II Record

Class: B.E. (Mech.)

A.Y.: 2019-2020

SVERI's College of Engineering, Pandharpur

DEPARTMENT OF MECHANICAL ENGINEERING

Academic Year – 2019-2020

Project Group for B.E. (Mechanical)

List of Students undertaking Project Work- I & II

Group No.	Sr. No.	Name of Student	Name of Project Guide	Title of the Project
1.	1	Waghmare Vishal Balasaheb	Prof. D. D. Ronge	Design, experiment and numerical anlysis of EAHE system for weather condition of Solapur, India.
	2	Kadam Vishal Janarath		
	3	Kate Pankaj Lalachand		
	4	Shende Suraj Kundalik		
	5	Patil Onkar Dadaso		
2.	6	Bhanvase Amar Maruti	Prof. S. J. Shinde	Design and performance analysis of PCM heat exchanger
	7	Gosavi Vaibhav Digambar		
	8	Jadhav Rishabh Dnyaneshwar		
	9	Godase Pavan Vilas		
3.	10	Chavan Sumit Sanjay	Prof. S. S. Jadhav	Experimental Study and optimization of process parameters for AISI H21 Material using DOE (Design Of Experiment) Techniques
	11	Tate Sudarshan Sushenrao		
	12	Sonage Ravikiran Siddharam		
	13	Patil Vikas		
	14	Akshay Narayan Ghodake		
4.	15	Khaladkar Vyankatesh Yuvraj	Prof. B. D. Gaikwad	Design and Developement of the Jig for the Centering and Facing Of Round Object
	16	Ajit S. Jadhav		
	17	Onkar P. Chidrewar		
	18	Swami Pranav Vivekanand		
5.	19	Ghodake Swapnil Prakash	Prof. B. T. Gadade	Fabrication of automatic pneumatic jack
	20	Mote Rama Appa		
	21	Panchal Nagesh Balaji		
	22	Kshirsagar Sushant		
6.	23	Shaikh Amir Makbul	Prof. S. N. More	Design & development of root based crop harvesting machine
	24	Ghodake Dattatraya Lahu		
	25	Ajinkya Sid		
	26	Sachin Waghmare		
7.	27	Devkar Samadhan Tanaji	Prof. S. B. Bhosale	Manufacturing and Analysis of Natural Sisal Fiberand Sugar Cane Powder Hybrid Composite.
	28	Gaikwad Siddheshwar Subhash		
	29	Bhosale Hemant Dilip		
8.	30	Deshmukh Ruturaj Abasaheb	Prof. S. Y. Salunkhe	Effect of vibration on surface quality of a part manufactured in an injection moulding machine.
	31	Aiwale Prathamesh Babu		
	32	Chavan Aniket Dnyaneshwar		
	33	Jadhav Shubham Jayshankar		
9.	34	Chavan Aniket Balasaheb	Prof. A. A. Mote	Development and Analysis of hybrid passenger tricycle
	35	Pore Onkar Gulabrao		
	36	Patil Pushkar Mahesh		
	37	Shinde Sudarshan Balasaheb		
10.	38	/Deshmukh Jyoti Balasaheb	Prof. O. L. Mahajan	Analysis of Natural Hybrid Composites made by Sugarcane waste powder (Baggase powder)
	39	/Kolekar Supriya Ravindra		
	40	/Patil Shruti Anil		
	41	/Deshmukh Aishwarya		
11.	42	/Abhangrao Komal Balbhim	Dr. R. R. Gidde	Design,fabrication and analysis of micromixer with circular baffles used in microfluidics applications
	43	/Kale Pallavi Rajkumar		
	44	/ Pujari Aruna Govardhan		
	45	/Lamgunde Pooja Somnath		
12.	46	Mhetre Gurudev Nagesh	/Prof. P. K. Bhuse	Diesel Engine Performance and Emissions Analysis by Using Duel Biodiesel and it's Blends
	47	Patil Shivprasad Namadeo		
	48	Vastre Ganesh Shankar		
	49	Deshpande Abhiram		
	50	Rathod Sumit R.		
13.	51	Gosavi Sachin Ramchandra	Prof. M. B. Kulkarni	Performance evalution of VCRS by using natural and artificial refrigerant
	52	Kawale Chaitanya Mukund		
	53	Devmare Avinash Arjun		
	54	Ghodake Mahesh Bharat		

(Prof. D.T. Kashid)
Project Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

SVERI's College of Engineering, Pandharpur
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Academic Year – 2019-2020
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Group No.	Sr. No.	Name of Student	Name of Project Guide	Title of the Project
14.	55	Pardeshi Amit Bandu	Prof. Y. M. Khedkar	Manufacturing and testing of convectional damper by magnetorheological approach .
	56	Pore Rohan Haridas		
	57	Dhat Sakharam Ekanath		
	58	Jadhav Arohan Anandrao		
15.	59	Shete Shivam Sanjay	Dr. S. S. Wangikar	Parametric optimisation of photochemical machining for Al-Cu material.
	60	Chavan Nikhil Vijay		
	61	Bhagwat Rushikesh Manoj		
	62	Gaikwad Suraj Subhash		
16.	63	Shalu Vishal Sudhakar	Dr. S. B. Salunkhe	Water desalination using Nanoporous Graphene Membrane
	64	Gade Omkar Govind		
	65	Debojeet Bhattacharjee		
	66	Gaikwad Viswas Savata		
17.	67	Bhosale Onkar Shashikant	Dr. S. B. Salunkhe	Agricultural water filtration using Graphene filters
	68	Kadlaskar Sourabh Sanjay		
	69	Deshpande Mihir Milind		
	70	Kulkarni Kedar Mahesh		
18.	71	Sakhare Rohit Pandurang	Prof. N. S. Shaikh	Design of water pumping system by using wind and solar energy
	72	Lohar Aakash Narayan		
	73	Vyavahare Yogesh Maruti		
	74	Gate Hanumant Dadasaheb		
19.	75	Masal Shriram Chandrakant	Prof. S. R. Gavali	Design and Fabrication of micromixer for Lab on Chip Applications
	76	Deshmukh Shrinath Jayavant		
	77	Dune Kiran Mahipati		
	78	Waghmode Onkar Suryakant		
20.	79	Ippanpalli Pranav Hiralal	Prof. S. M. Khomane	Design and fabrication of polishing machine for metallurgical specimen.
	80	Rakate Akash Bharat		
	81	Wadgave Indrajit		
	82	Ingle Sachin Suresh		
	83	Tele Nitin Shankar		
21	84	Ghongade Vishal Bapurao	Prof. C. C. Jadhav	Hybrid Sugar Cane Lifting Machine
	85	Karande Akshay Ravasaheb		
	86	Kotyal Shridhar		
	87	Shaikh (Shikalgar) Mujammil		
22	88	Vivek Vijay Waydande	Prof. K. S. Pukale	Process optimization of Photo chemical machining on 3D surface (stainless steel)
	89	Vijay Prakash Jadhav		
	90	Prashant Bharat Vansale		
	91	Sachin Vaman Torane		
23	92	Bhingare Vijay Arjun	Prof. A. K. Parkhe	Analysis of roller conveyor chain and composite blade using conditioning monitoring approach.
	93	Ronge Nagesh Sudhakar		
	94	Ranadive Savata Sadhu		
	95	Hake Akshay Arun		
24	96	Gaikwad Pruthvijit Vasudev	Prof. S.Y. Salunkhe	Vibration analysis and fault diagnosis of injection moulding machine.
	97	Gaikwad Sagar Navnath		
	98	Phalake Suhas Shrimant		
	99	Sawant Bhushan Pradyumna		

(Prof. D.T. Kashid)
Project Coordinator

(Dr. S. A. Sonawane)
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SVERI's College of Engineering, Pandharpur
DEPARTMENT OF MECHANICAL ENGINEERING
Academic Year – 2019-2020
Project Group for B.E. (Mechanical)
List of Students undertaking Project Work- I & II

Group No.	Sr. No.	Name of Student	Name of Project Guide	Title of the Project
25	100	Chavan Adarsh Valu	Prof. V. R. Chavan	Humped Shape Type Fin And Tube Heat Exchanger By Using New Shape of Vertex Genrator
	101	Torane Sunil Mohan		
	102	Khade Sagar Bhimashankar		
	103	Vikram Vhanmane		
26	104	Naiknavare Mayur Baburao	Prof. S. M. Kale	Design and Retrofitting of Hybrid Personal Vehicle.
	105	Popale Ganesh Navanath		
	106	Landage Balaji Vitthal		
	107	Charansinha U. Raut		
27	108	/Makar Supriya	Prof. S. V. Jadhav	Effect of different obstacles size variation on the performance of microchannel.
	109	/Kame Mansi		
	110	/Namde Pooja		
	111	/Sarvagod Manali		
28	112	Karan P. Warkhedkar	Prof. D. T. Kashid	Analysis of Drag and Lift Forces on blades of wind turbine by the case study of NACA 4415 aerofoil
	113	Keskar Krushnadev Arjun		
	114	Sayyad Sameer Mansub		
	115	Laxman Pachkawade		
29	116	Khadatare Rahul Suresh	Prof. A. K. Parkhe	Design and Development of Mini Belt Grinding Machine.
	117	Pravin Vikram Chavan		
	118	Wagh Govind R.		
	119	Atkale Shubhan R.		
30	120	Kale Shubham Shankar	Prof. D. T. Kashid	Design and Development of Spreadability Testing Apparatus For Semisolids
	121	Khot Sagar Balu		
	122	Tamboli Sultan Motilal		
	123	Mahapure Suraj Bapu		
31	124	Shubham Ashok Dixit	Prof. S. S. Jadhav	PERFORMANCE OF HEAT PIPE WITH DIFFERENT INCLINATION ANGLES USING ALUMINIUM NANOFLUID
	125	Pritam Madhukar Gaikwad		
	126	Pansare Kamlesh		
	127	Shubham Nirgun Kolekar		
32	128	Katale Ganesh Karan	Prof. A. A. Mote	Fabrication and characterization of composite from sugarcane bagasse and waste plastic for domestic thermal insulation
	129	Sonwalkar Ashutosh H.		
	130	Mali Mayur		
	131	Gunjal Ravindra		
33	132	Aniket Gawade	Prof. C. C. Jadhav	Generation of electric power with INVELOX venturi wind turbine
	133	Suraj Netake		
	134	Pratap Netake		
	135	Kiran Babar		
	136	Akshay Vibhute		

(Prof. D.T. Kashid)
Project Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

SVERI

Engineering for Excellence

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

This is to certify that the dissertation entitled

"Design, experiment and numerical anlysis of EAHE system for weather condition of Solapur, India."

has been submitted by

Project Group No.:- 01

1) Waghmare Vishal Balasaheb
2) Kadam Vishal Janarath
3) Kate Pankaj Lalachand
4) Shende Suraj Kundalik
5) Patil Onkar Dadaso

For partial fulfillment of Bachelor Degree in Mechanical Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. D. D. Ronge)
Project Guide

(Dr. S. S. Wangikar)
Head, Mech. Engg. Dept.

(Dr. B. P. Ronge)
Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

This is to certify that the dissertation entitled
"Design and performance analysis of PCM heat exchange."
has been submitted by

Project Group No.:- 02

1) Bhanvase Amar Maruti
2) Gosavi Vaibhav Digambar
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2) Tate Sudarshan Sushenrao
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5) Akshay Narayan Ghodake

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2) Ajit S. Jadhav
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2) Mr. Ghodake Dattatraya Lahu
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"Manufacturing and Analysis of Natural Sisal Fiber and Sugar Cane Powder Hybrid Composite."

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Project Group No.:- 07

1) Mr. Devkar Samadhan Tanaji
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"Effect of vibration on surface quality of a part manufactured in an injection moulding machine"

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1) Mr. Deshmukh Ruturaj Abasaheb
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This is to certify that the dissertation entitled

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has been submitted by

Project Group No.:- ۱۰

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"Design,fabrication and analysis of micromixer with circular baffles used in microfluidics applications"

has been submitted by

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This is to certify that the dissertation entitled

"Diesel Engine Performance and Emissions Analysis by Using Duel Biodiesel and it's Blends"

has been submitted by

Project Group No.:- 12

1) Mr. Mhetre Gurudev Nagesh
2) Mr. Patil Shivprasad Namadeo
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"Performance evalution of VCRS by using natural and artificial refrigerant"

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1) Mr. Gosavi Sachin Ramchandra
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This is to certify that the dissertation entitled

"Manufacturing and testing of convectional damper by magnetorheological approach"

has been submitted by

Project Group No.:- 14

1) Mr. Pardeshi Amit Bandu
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3) Mr. Bhagwat Rushikesh Manoj
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1) Mr. Shalu Vishal Sudhakar
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3) Mr. Debojeet Bhattacharjee
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"Design and Fabrication of micromixer for Lab on Chip Applications"

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"Analysis of roller conveyor chain and composite blade using conditioning monitoring approach"

has been submitted by

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2) Mr. Ronge Nagesh Sudhakar
3) Mr. Ranadive Savata Sadhu
4) Mr. Hake Akshay Arun

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4) Mr. Sawant Bhushan Pradyumna

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3) Miss. /Namde Pooja
4) Miss. /Sarvagod Manali

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This is to certify that the dissertation entitled

"Analysis of Drag and Lift Forces on blades of wind turbine by the case study of NACA 4415 aerofoil"

has been submitted by

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2) Mr. Keskar Krushnadev Arjun
3) Mr. Sayyad Sameer Mansub
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"Design and Development of Spreadability Testing Apparatus For Semisolids"

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This is to certify that the dissertation entitled

"PERFORMANCE OF HEAT PIPE WITH DIFFERENT INCLINATION ANGLES USING ALUMINIUM NANOFLUID"

has been submitted by

Project Group No.:- 31

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This is to certify that the dissertation entitled

"Fabrication and characterization of composite from sugarcane bagasse and waste plastic for domestic thermal insulation"

has been submitted by

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This is to certify that the dissertation entitled

"Generation of electric power with INVELOX venturi wind turbine"

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Project Group No.:- 33

1) Mr. Aniket Gawade
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4) Mr. Kiran Babar
5) Mr. Akshay Vibhute

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Sample Project Report

A.Y.: 2019-2020

A

Project Report

on

"Static & Dynamic analysis of Composite Blade using conditioning monitoring approach"

Submitted & Presented in the fulfillment of the requirement for the award of

Bacholor Degree In Mechanical Engineering

To

Punyashlok Ahilyadevi Holkar Solapur University,Solapur.

By

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2) Ronge Nagesh Sudhakar	Roll No.[BB61]
3) Bhingare Vijay Arjun	Roll No.[BA07]
4) Ranadive Savata Sadhu	Roll No.[BB59]

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Under the guidance of
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DEPARTMENT OF MECHANICAL ENGINEERING
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Academic Year: 2019-2020

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ACKNOWLEDGEMENT:

This work is just not an individual contribution till its completion. We take this opportunity to thank all for bringing it close to theconclusion.

First of all, we thankful to **Prof. Dr. S. S. Wangikar, Head of Mechanical Engineering Department**, for accepting our studentship, continuously assessing our work and providing great guidance by timely suggestions and discussions at every stage of this work. We convey our deepest gratitude to **our guide Prof. A. K. Parakhe** for his expert guidance, inspiration, suggestion and constant encouragement during entire course of this project work, which enabled us to bring out this report in an eloquent manner. Without his guidance, directions and constructive criticisms, this Dissertation would have been impossible. Therefore we deeply thank to our guide from our inner heart.

We also thankful to **Prof. D. T. Kashid** and **Prof. C. K. Vhare** for helping us at every stage without which this work would not have been possible.

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Abstract:

The use of composite materials has been increased in different industries like civil, mechanical, aerospace engineering due to their better properties. The rotating blade plays an important role in engineering structures such as turbine blades, airplane propellers, and helicopter blades. This deals with static analysis of composite blade to estimate the material uncertainty by measuring the deflection. The composite blade is fixed like a cantilever beam. To measure this deflection the Hall Effect Sensor is developed which is non contact device works on magnetic field. If magnet is come in front of sensor it creates magnetic field between them and that change in voltage or field is calibrated in terms of deflection of blade. The same process is carried for all the blades to check their uncertainty present in it. Also, it is deals with the dynamic analysis of blade to check their behavior in the axis under rotating condition for different RPM. The acceleration is considered as performance parameter to check the behavior of blade. Also, the setup is developed for accelerations measurement GY-521 Accelerometer. The accelerometer has kept at free end of blade and accelerations are taken in three directions for each rpm and it is represented in a graphical form. The analysis is carryout for both damaged and undamaged blade. The both studies are carried out using condition monitoring approach to observe their behavior of blade in static & dynamic condition before used in any application.

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Chapter 1

Introduction to Composite Material

1.1 Introduction:

Fiber - reinforced composite materials have been used over the past few decades in a variety of structures. Thin-walled structural shapes made up of composite materials, which are usually produced by pultrusion, are being increasingly used in many engineering fields. Composite materials are widely used in the aircraft industries because of their superior fatigue characteristics, greater damage tolerances, and larger stiffness-to-weight ratios as compared with their metal counterparts. In helicopter rotor applications, composite materials can bring additional features like drastic reduction in the number of parts and bulkiness, especially for the rotor hub system, which is typically a large source of the profile drag. Despite these advantages, composite materials generally increase the level of uncertainties for the overall structural system. [2]

A composite material can be defined as a combination of two or more materials that results in better properties than those of the individual components used alone. In contrast to metallic alloys, each material retains its separate chemical, physical, and mechanical properties. The two constituents are reinforcement and a matrix. The main advantages of composite materials are their high strength and stiffness, combined with low density, when compared with bulk materials, allowing for a weight reduction in the finished part. The composite blade has the features of high efficiency, low consumption and good mechanical characteristic, so its prospect of development and application in engineering structures is broad and promising. To meet the needs of space navigation, mechanics and the construction industry, the design and analysis of the mechanical behavior of thin-walled composite blade have become an active research area. [1]

In composites, materials are combined in such a way as to enable us to make better use of their virtues while minimizing to some extent the effects of their deficiencies. This process of optimization can release a designer from the constraints associated with the selection and manufacture of conventional materials. He can make use of tougher and lighter materials, with properties that can be tailored to suit particular design requirements. And because of the ease with which complex shapes can be

manufactured, the complete rethinking of an established design in terms of composites can often lead to both cheaper and better solutions. [2]

1.2 Composite Overview:

Materials can be classified as Isotropic, Anisotropic, and Orthotropic Materials; Isotropic material: Isotropic materials have the same material properties in all directions, and normal loads create only normal strains. A material is isotropic if the properties are independent of direction within the material. Anisotropic material: They have different material properties in all directions at a point in the body. There are no material planes of symmetry, and normal loads create both normal strains and shear strains. Orthotropic Material: Composites are a subclass of anisotropic materials that are classified as orthotropic. Orthotropic materials have properties that are different in three mutually perpendicular directions. They have three mutually perpendicular axes of symmetry, and a load applied parallel to these axes produces only normal strains. However, loads that are not applied parallel to these axes produce both normal and shear strains. Therefore, orthotropic mechanical properties are a function of orientation.

1.3 Common Categories of Composite Materials:

A typical composite material is a system of materials composing of two or more materials (mixed and bonded) on a macroscopic scale. Generally, a composite material is composed of reinforcement (fibers, particles, flakes, and/or fillers) embedded in a matrix (polymers, metals, or ceramics).The matrix holds the reinforcement to form the desired shape while the reinforcement improves the overall mechanical properties of the matrix. When designed properly, the new combined material exhibits better strength than would each individual material. The following is an introduction to composite materials constituents, product forms, and fabrications processes. [1]

a) Reinforcements:

The principal purpose of the reinforcement is to provide superior levels of strength and stiffness to the composite. In a continuous fiber-reinforced composite, the fibers provide virtually all of the strength and stiffness. Even in particle reinforced composites, significant improvements are obtained As mentioned earlier, typical

reinforcing materials (graphite, glass, SiC, alumina) may also provide thermal and electrical conductivity, controlled thermal expansion, and wear resistance in addition to structural properties. By far the most widely used reinforcement form in high performance OMCs are fiber tows. These typically consist of thousands of fine filaments arranged in a single bundle. A fiber tow can be handled as a single unit and so can be wrapped or woven using commercial equipment. [3]

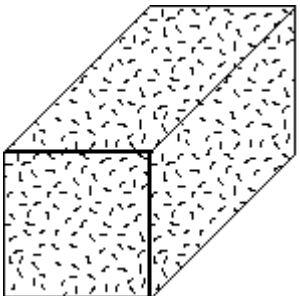
b) Matrices:

The purpose of the matrix is to bind the reinforcements together by virtue of its cohesive and adhesive characteristics, to transfer load to and between reinforcements, and to protect the reinforcements from environments and handling. The matrix also provides a solid form to the composite, which aids handling during manufacture and is typically required in a finished part. This is particularly necessary in discontinuously reinforced composites, because the reinforcements are not of sufficient length to provide a handle able form. Because the reinforcements are typically stronger and stiffer, the matrix is often the "weak link" in the composite, from a structural perspective. As a continuous phase, the matrix therefore controls the transverse properties; inter laminar strength, and elevated-temperature strength of the composite. However, the matrix allows the strength of the reinforcements to be used to their full potential by providing effective load transfer from external forces to the reinforcement. [3]

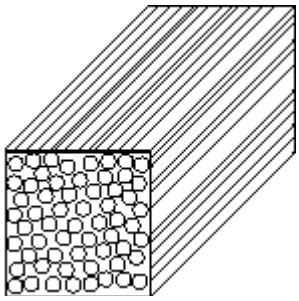
The matrix holds reinforcing fibers in the proper orientation and position so that they can carry the intended loads and distributes the loads more or less evenly among the reinforcements. Further, the matrix provides a vital inelastic response so that stress concentrations are reduced dramatically and internal stresses are redistributed from broken reinforcements. [3]

Based on the form of reinforcement, common composite materials can be classified as follows:

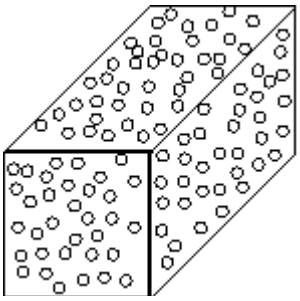
1. Fibrous reinforced composites:
    a. Random fiber (short fiber) reinforced composites
    b. Continuous fiber (long fiber) reinforced composite.
2. Particles as the reinforcement (Particulate composites)
3. Flat flakes as the reinforcement (Flake composites)



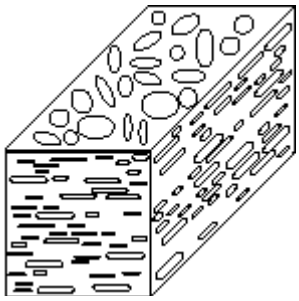
Random reinforced composite



Continuous reinforced composite



Particulate composites



Flake composites

Figure 1.1 Classification of composite materials

1.4 Introduction and Terminology of Composite:

A composite material is a macroscopic combination of two or more distinct materials, having a recognizable interface between them. Composites are used not only for their structural properties, but also for electrical, thermal, Tribological, and environmental applications. Modern composite materials are usually optimized to achieve a particular balance of properties for a given range of applications. A fiber has a length that is much greater than its diameter. The length-to-diameter (l/d) ratio is known as the aspect ratio and can vary greatly. Continuous fibers have long aspect ratios, while discontinuous fibers have short aspect ratios. Continuous-fiber composites normally have a preferred orientation, while discontinuous fibers generally have a random orientation. Examples of continuous reinforcements include unidirectional, woven cloth and helical winding, while examples of discontinuous reinforcements are chopped fibers and random mat. Continuous-fiber composites are often made into laminates by stacking single sheets of continuous fibers in different orientations to obtain the desired strength and stiffness properties with fiber volumes as high as 60 to 70 percent. Fibers produce high-strength composites because of their small diameter;

they contain far fewer defects (normally surface defects) compared to the material produced in bulk. As a general rule, the smaller the diameter of the fiber, the higher its strength, but often the cost increases as the diameter becomes smaller. In addition, smaller-diameter high-strength fibers have greater flexibility and are more amenable to fabrication processes such as weaving or forming over radii. Typical fibers include glass, aramid, and carbon, which may be continuous or discontinuous fiber [3].

1.4.1 Reinforcement of Composite:

a) Continuous fiber composite

Continuous fiber-reinforced composites contain reinforcements having lengths shorter than their cross-sectional dimensions. When the length of the fiber is such that any further increase in length does not, for example, further increase the elastic modulus or strength of the composite, the composite is considered to be continuous fiber reinforced. Most continuous fiber (or continuous filament) composites, in fact, contain fibers that are comparable in length to the overall dimensions of the composite part. The continuous phase is the matrix, which is a polymer, metal, or ceramic. Polymers have low strength and stiffness, metals have intermediate strength and stiffness but high ductility, and ceramics have high strength and stiffness but are brittle. The matrix (continuous phase) performs several critical functions, including maintaining the fibers in the proper orientation and spacing and protecting them from abrasion and the environment. In polymer and metal matrix composites that form a strong bond between the fiber and the matrix, the matrix transmits loads from the matrix to the fibers through shear loading at the interface. In ceramic matrix composites, the objective is often to increase the toughness rather than the strength and stiffness; therefore, a low interfacial strength bond is desirable [3].

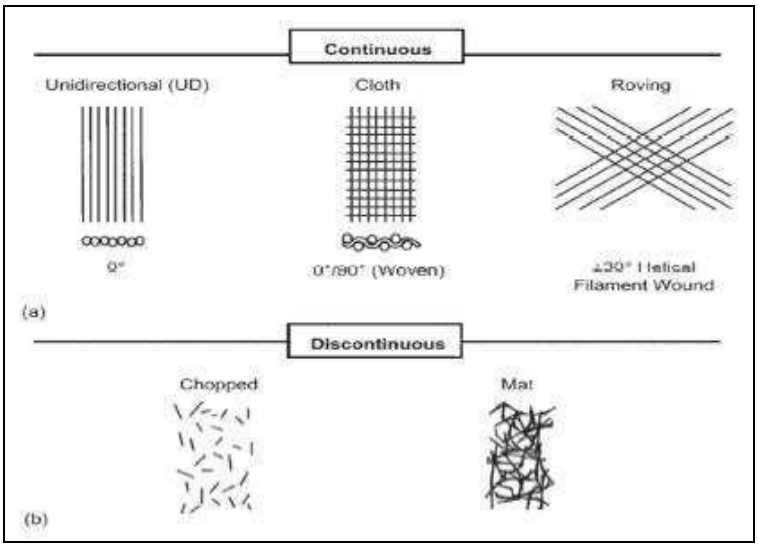


Figure 1.2 Typical reinforcement types

b) Discontinuous fiber composite:

Discontinuous-fiber composites are normally somewhat random in alignment, which dramatically reduces their strength and modulus. However, discontinuous-fiber composites are generally much less costly than continuous-fiber composites. Therefore, continuous-fiber composites are used where higher strength and stiffness are required (but at a higher cost), and discontinuous-fiber composites are used where cost is the main driver and strength and stiffness are less important. Both the reinforcement type and the matrix affect processing. The major processing routes for polymer matrix composites are shown in Fig. 1.4 Two types of polymer matrices are shown: thermosets and thermoplastics. A thermoset starts as a low-viscosity resin that reacts and cures during processing, forming an intractable solid. A thermoplastic is a high-viscosity resin that is processed by heating it above its melting temperature. Because a thermoset resin sets up and cures during processing, it cannot be reprocessed by reheating. [2]

1.4.2 Ply angle orientation of composite:

Orthotropic materials have properties that are different in three mutually perpendicular directions. They have three mutually perpendicular axes of symmetry, and a load applied parallel to these axes produces only normal strains. However, loads that are not applied parallel to these axes produce both normal and shear strains. Therefore, orthotropic mechanical properties are a function of orientation. However,

if the material is anisotropic (for example, the composite ply shown in Fig. 1.5), it has properties that vary with direction within the material. In this example, the moduli are different in each direction (E0° ≠ E45° ≠ E90°). While the modulus of elasticity is used in the example, the same dependence on direction can occur for other material properties, such as ultimate strength, Poisson's ratio, and thermal expansion coefficient. Bulk materials, such as metals and polymers, are normally treated as isotropic materials, while composites are treated as anisotropic. However, even bulk materials such as metals can become anisotropic—for example, if they are highly cold worked to produce grain alignment in a certain direction. [1]

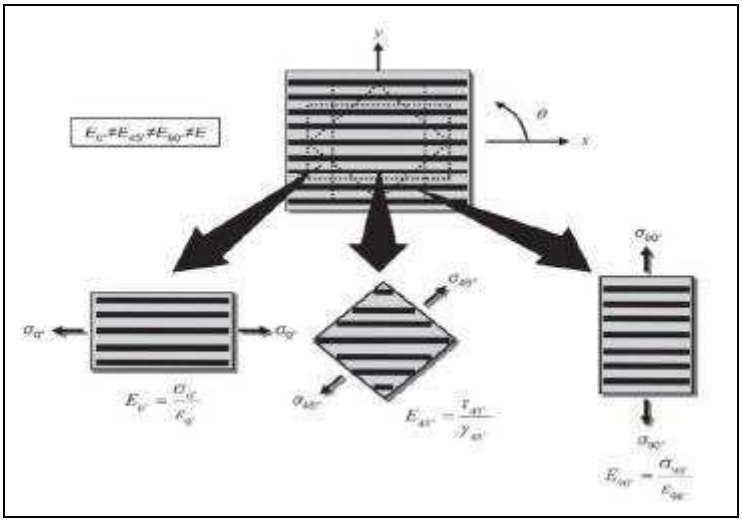


Figure 1.3 Element of composite ply material under stress [2]

Consider the unidirectional fiber-reinforced composite ply (also known as a lamina) shown in Fig. 1.3. The coordinate system used to describe the ply is labeled the 1-2-3 axes. In this case, the 1-axis is defined to be parallel to the fibers (0°), the 2 axis is defined to lie within the plane of the plate and is perpendicular to the fibers (90°), and the 3-axis is defined to be normal to the plane of the plate. The 1-2-3 coordinate system is referred to as the principal material coordinate system.

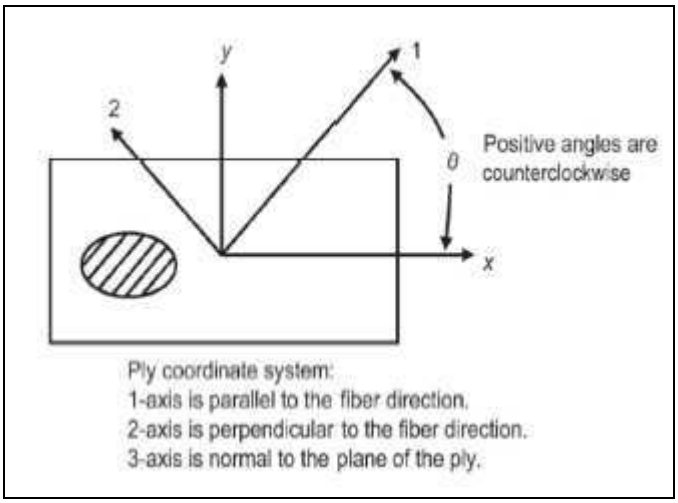


Figure 1.4 Ply angle definition [2]

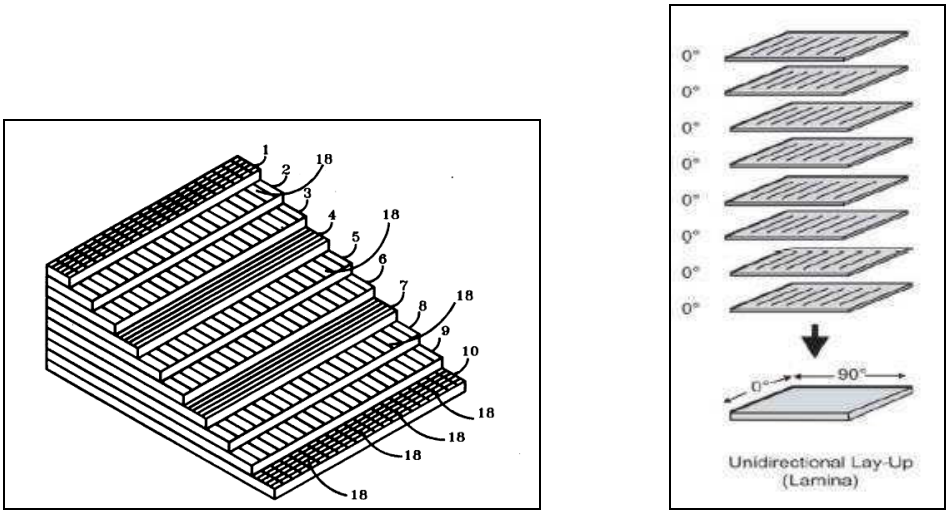
If the plate is loaded parallel to the fibers (one- or zero-degree direction), the modulus of elasticity E11 approaches that of the fibers. If the plate is loaded perpendicular to the fibers in the two- or 90-degree direction, the modulus E22 is much lower, approaching that of the relatively less stiff matrix. Since E11 >> E22 and the modulus varies with direction within the material, the material is anisotropic. Thus, when the fibers are aligned parallel (0°) or perpendicular (90°) to the direction of applied stress, the lamina is known as a specially orthotropic lamina ($\theta = 0°$ or 90°). A lamina that is not aligned parallel or perpendicular to the direction of applied stress is called a general orthotropic lamina ($\theta \neq 0°$ or 90°). [2]

1.4.3 Laminates:

When there is a single ply or a lay-up in which all of the layers or plies are stacked in the same orientation, the lay-up is called a lamina. When the plies are stacked at various angles, the lay-up is called a laminate. Continuous-fiber composites are normally laminated materials (Fig. 1.7) in which the individual layers, plies, or laminae are oriented in directions that will enhance the strength in the primary load direction. Unidirectional (0°) laminae are extremely strong and stiff in the 0° direction. [1]

Composites are rarely used in the form of unidirectional laminates, since one of their great merits is that the fibres can be arranged so as to give specific properties in any desired direction. Thus, in any given structural laminate, predetermined proportions of the unidirectional plies will be arranged at some specific angle, θ, to the stress direction. In order to calculate the properties of such a multi-ply laminate, it is first

necessary to know how the elastic response of a single unidirectional lamina, such as that which we have been considering so far, will vary as the angle to the stress direction is changed [1]. However, they are very weak in the 90° direction because the load must be carried by the much weaker polymeric matrix. Because the fiber orientation directly impacts mechanical properties, it seems logical to orient as many of the layers as possible in the main load-carrying direction. [1]



[02/90/02/90/02] la up **Lamina**

Figure 1.5 Lamina and laminate lay-up [2]

One of the most common forms of fiber-reinforced composite materials is the cross plied laminate, in which the fabricator lays up a sequence of unidirectional reinforced plies" as indicated in following fig.1.6. Each ply is typically a thin (approximately 0.2 mm) sheet of collimated fibers impregnated with an uncured epoxy or other thermosetting polymer matrix material. The orientation of each ply is arbitrary, and the layup sequence is tailored to achieve the properties desired of the laminate. [1]

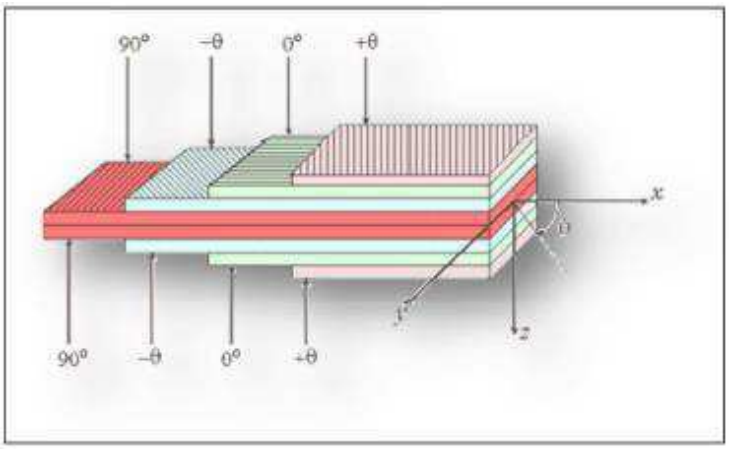


Figure 1.6 Laminated composite [1]

The longitudinal tension and compression loads are carried by the fibers, while the matrix distributes the loads between the fibers in tension and stabilizes the fibers and prevents them from buckling in compression. The matrix is also the primary load carrier for inter laminar shear (i.e., shear between the layers) and transverse (90°) tension. Because the fibre orientation directly impacts mechanical properties, it seems logical to orient as many of the layers as possible in the main load-carrying direction. While this approach may work for some structures, it is usually necessary to balance the load-carrying capability in a number of different directions, such as the 0°, +45°,-45°, and 90° directions. [1]

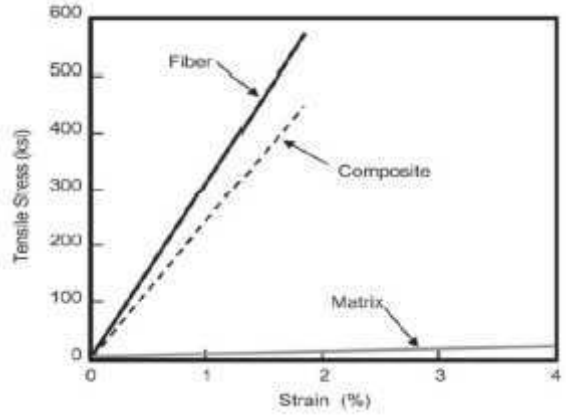


Figure 1.7 Comparison of tensile properties of fiber, matrix, and composite [1]

Laminates are composite material where different layers of materials give them the specific character of a composite material having a specific function to perform. Fabrics have no matrix to fall back on, but in them, fibers of different compositions combine to give them a specific character. Reinforcing materials generally withstand maximum load and serve the desirable properties [1].

1.5 Objectives and Methodology:

Objectives of the study and brief methodology to achieve these objectives are summarized below:

1. **To study Experimental Analysis of Composite blade in Static and Dynamic Condition:**
   It is important to conduct analysis of thin walled carbon fiber composite blade in non-rotating condition to get various basic parameters that are useful in rotating condition analysis. So, the Deflection at free end is to be carried out under point load is applied at free end of the beam, therefore composite blade is considered as

cantilever type. This analysis is carried out in static condition. Also Dynamic analysis is carried out for different rpm.

2. **To study behavior of damaged Composite blade in Dynamic condition:**

   Behavior of composite blades in rotating condition depends on its various factors such as design of blade, balancing, and speed etc. Therefore, there is need to study the effects of RPM or number of rotations of blades on damaged and undamaged composite blade to check its behavior in rotation condition.

1.6 Organisation of thesis:

CHAPTER 1:

This chapter gives the overview about composite material. There are different categories or types of composite material, are also explained in this chapter. The common terminology for composite material is given. Then types of composite, its layup sequence, ply angle, lamina etc. all this details are given in this chapter. Finally, objectives and methodology of the proposed work is explained in detail.

CHAPTER 2:

A lot of research has been done on composite blade both experimentally and numerically and analytically. This chapter deals with the literature review of static and dynamic analysis of composite blade , modeling of composite blade , natural frequency analysis of blade in undamaged-damaged condition, behavior of damaged composite blade in rotating condition.

CHAPTER 3:

In this study the composite blade is used for analysis in different conditions. The details of blade are explained in this chapter. Dimensions, material used for particular blade , its layup sequence, and material properties are also given in detail. Then, the fabrication process of composite material is also explained in detail with experimental setups.

CHAPTER 4:

This chapter details with static analysis of composite blade for different parameters like deflection. The experimentation is carried out on blade to find uncertainty present in material using deflection parameter.

CHAPTER 5:

This chapter is deals with experimental study on to check the behavior of undamaged and damaged composite blade in rotating condition for different rpm with different locations. Hence, blade is damaged at different locations by producing the cracks on it. The experimentation is carried on rotating composite blade to measure the accelerations for different rpm using GY-521 accelerometer and Arduion setup. This is also carried out for both undamaged and damaged blade and obtained results are represented in graphical form.

1.7 Summary:

The overview about composite material is explained in this chapter. Then, the common categories and types of composite materials are also explained in details. Also material with different ply angle, lay up sequence, matrix, terminology of composite material all this information is given in detail. Then, the objectives, methodology and organisation of thesis are explained in shortly.

Chapter 2

Literature Review

A lot of research has been done on composite blade, both experimentally and numerically and analytically. This chapter deals with the literature review of static and dynamic analysis of composite blade of blade in undamaged-damaged condition, behavior of damaged composite blade in rotating condition. This chapter is divided into the following sections:

1) Static analysis of composite blade
2) Dynamic analysis of composite blade in rotating condition
3) Behavior of undamaged and damaged composite box beam in rotating condition

2.1 Static analysis of composite blade:

Vlasov et al. [1] developed the theory of thin-walled members made of isotropic materials. Up to the present, investigation into the stability and vibration behavior of these members has received widespread attention and has been carried out extensively. Many numerical techniques have been used to solve the dynamic analysis of these members. One of the most effective approaches was done to derive the exact stiffness matrices based on the solution of the differential equation of beam. Numerical results are obtained for thin-walled composite box beams to investigate the effects of axial force, fiber orientation and modulus ratio on the natural frequencies, load–frequency interaction curves and corresponding vibration mode shapes. Thin walled beams made of isotropic materials have been studied by many authors .Some works have been devoted to the analysis of the flexural-torsion properties of thin walled composite beams. Vlasov's theory was extended for the bending and twisting of thin-walled composite beams with open cross-section made from symmetric fiber reinforced laminates and for composite beams with arbitrary geometric and material sectional properties. Some papers have also been published dealing with the optimization of composite thin-walled cross-section beams.

Barradas et al. [2] has performed the optimal design of cross-section properties of thin-walled laminated composite beams. These properties are expressed as integrals based on the cross-section geometry, on the warping functions for torsion, shear

bending and shear warping, and on the individual stiffness of the laminates constituting the cross-section. The finite element method is used in discretizing the theory. For design sensitivity calculations, the cross-section is modeled throughout design elements. Geometrically, these elements may coincide with the laminates that constitute the cross-section. The developed formulation is based on the concept of adjoint structure. After a warping function is calculated for the cross-section, an adjoint problem may be formulated for each of the properties and a corresponding adjoint warping is determined. It can be applied in a unified way to open, closed or hybrid cross-sections. Design optimization is performed by nonlinear programming techniques. Laminate thickness and lamina orientations are considered as design variables.

Kato et al. [3] described an optimization strategy of fiber reinforced composites. Although the methodical concept is very general we concentrate on Fiber Reinforced Concrete with a complex failure mechanism resulting from material brittleness of both constituent's matrix and fibers. Because of these unfavorable characteristics the interface between fiber and matrix plays a particularly important role in the structural response. A prominent objective for this kind of composite is the improvement of ductility. The influential factors on the entire structural response of this composite are (i) material parameters involved in the interface, (ii) the material layout at the small scale level, and (iii) the fiber geometry on the macroscopic structural level. Paper gives the structural ductility of the fiber reinforced composites applying an optimization method with respect to the geometrical layout of continuous long textile fibers. The method proposed is achieved by applying a so-called embedded reinforcement formulation. This methodology is extended to a damage formulation in order to represent a realistic structural behavior. For the optimization problem a gradient-based optimization scheme is assumed. An optimality criteria method is applied because of its numerically high efficiency and robustness. The performance of the method is demonstrated by a series of numerical examples; it is verified that the ductility can be substantially improved.

Pawar et al. [4] studied a cantilever composite box beam with 0^0 and 90^0 plies is used for Eigenvalue analysis. In the present work, COMSOL Multiphysics, a structural solid mechanics tool, is used to study the Eigenvalue analysis of composite box beam.

The beam is analyzed at different Eigen frequency value and different angular velocity for getting different mode shapes. And also for the different rotational speed the displacement value of composite box beam is analyzed.

Aktas et al. [5] investigated deflection function of orthotropic cantilever beam subjected to point load are obtained using anisotropic elasticity. The deflection at the free end of the beam is calculated numerically using obtained formulas for different fiber directions.

Mehdi et al. [7] presented presents the Computational modal analysis of a composite beam with and without cracks. In this work, the mechanical properties of aluminum and fiber (Nylon and Glass fiber reinforcement plastic) are measured a universal testing machine. The three-dimensional finite element models of composite beam with and without cracks are constructed and then computational modal analysis on ANSYS-14 is then performed to generate natural frequencies and mode shapes. The location of cracks will vary from 10 to 90 % of beam length. The finite element model agrees well with the analytical values.

Yasmeen et al. [8] studied that two Fiber- Reinforced Plastic (FRP) materials, Graphite Fibre Reinforced Polyamide and E-Glass Fibre Reinforced Polymer have been selected as beam materials for modal analysis using ANSYS 13.0. The analysis is carried out for these two beams in different ways. Initially the analysis is carried out for different orientation of fibers for two beams. Later the effect of dimensions is analyzed by varying one dimension of the beam at a time by keeping the other two constant. In the next step the analysis is performed for constant dimensions of each beam for same layer orientation and constant volume fraction of fiber by introducing transverse cracks of different depths at various positions along the length of the beam. The results obtained are analyzed.

Kumar et al. [8] investigate of the effects of cracks on a cantilever composite beam, made of Aluminum- reinforced GFRP and Aluminum reinforced Nylon. The mechanical properties of aluminum and fibers (Nylon and Glass fiber reinforcement polymer) are measured with universal testing machine. The beams are made of Aluminum and synthetic fibers of dimensions 500x30x6 mm. The Cracks are provided on the cantilever beam which is varying from 10 to 90% of beam length, and

we investigate the natural frequency of all five mode shapes with zero cracks to ninth cracks on the beam.

Prasad et al. [9] investigates the accuracy of predicting the dynamic response by finite element modeling of structures with cracks. Steel and composite materials are widely used in various construction elements and composites in particular have increased substantially over the past few years. These materials are subjected to various types of damage, mostly cracks and delamination. These result in local changes of the stiffness of elements from such materials and consequently their dynamic characteristics are altered. The cracks are modeled as such in case of stress analysis to study the stress pattern at those local regions of crack; while in case of dynamic analysis an equivalent model is built with many assumptions.

2.2 Dynamic analysis of composite blade in rotating condition:

Chung et al. [14] presented a finite element analysis for a rotating cantilever beam. Based on a dynamic modelling method using the stretch deformation instead of the conventional axial deformation, three linear partial differential equations are derived from Hamilton's principle. Two of the linear differential equations are coupled through the stretch and chordwise deformations. The other equation is an uncoupled one for the flapwise deformation. From these partial differential equations and the associated boundary conditions, are derived two weak forms: one is for the chordwise motion and the other is for the flapwise motion. The weak forms are spatially discretized with newly defined two-node beam elements. With the discretized equations, the behaviors of the natural frequencies are investigated for the variation of the rotating speed. In addition, the time responses and distributions of the deformations and stresses are computed when the rotating speed is prescribed. The effects of the rotating speed profile on the vibrations of the beam are also investigated.

Yao et al. [11] investigated the nonlinear dynamic responses of the rotating blade with varying rotating speed under high-temperature supersonic gas flow. The varying rotating speed and centrifugal force are considered during the establishment of the analytical model of the rotating blade. The rotating blade is treated as a pretwist, presetting, thin-walled rotating cantilever beam. Using the isotropic constitutive law

and Hamilton's principle, the nonlinear partial differential governing equation of motion is derived for the pretwist, presetting, thin-walled rotating beam. Based on the obtained governing equation of motion, Galerkin's approach is applied to obtain a two-degree-of-freedom nonlinear system. Numerical simulations are performed to study the nonlinear dynamic response of the rotating blade. In summary, numerical studies suggest that periodic motions and chaotic motions exist in the nonlinear vibrations of the rotating blade with varying speed.

Ohtsuka et al. [12] studied the deformation and the stress of an axial flow compressor rotor blade under the loading of centrifugal forces. Coupled deformation of extension, bending, torsion and transverse shear of a pretwisted curved bar with arbitrary cross section is considered. Governing equations derived by means of the principle of virtual work are solved numerically by finite difference method. The warping functions used in the analysis were obtained by the use of finite element method. Measurement of the untwist angles and the stresses were carried out for the verification of the numerical analysis and they were found to be in good agreement.

Sina, et al. [13] studied the Axial–torsional vibrations of rotating pretwisted thin-walled composite box beams exhibiting primary and secondary warping are investigated. Considering the nonlinear strain–displacement relations, the coupled nonlinear axial–torsional equations of motion are derived using Hamilton0s principle. Ignoring the axial inertia term leads to differential equation of motion in terms of elastic torsion in the case of axially immovable beams. Centrifugal load in the presence of material anisotropy and pretwist angle leads to an induced static torque. The nonlinear equation should be linearized about the corresponding equilibrium state to obtain the linear differential equation of motion. Extended Galerkin0s method is utilized to achieve the proper Eigenvalue problem. The results obtained in this paper seek to clarify the individual and collective effects of axial loading, pretwist, stagger and fiber angles on the torsional behavior of the non-uniform thin-walled composite blades. The results are compared to available analytical and experimental results in the literature which reveals excellent agreements. The outcomes of this study are expected to offer better predictions of the dynamic behavior of this kind of structures in general, and in design of rotor blades of turbo-machinery, in particular.

Rao, et al. [14] establishes the stiffness and mass matrices of a rotating twisted and tapered beam. The angle of twist, breadth and depth are assumed to vary linearly along the length of beam. The effects of shear deformation and rotary inertia are also considered in deriving the elemental matrices. The first four natural frequencies and mode shapes in bending-bending mode are calculated for cantilever beams. The effects of twist, offset, speed of rotation and variation of depth and breadth taper ratios are studied.

Della, et al. [15] develops a finite element (FE) model to study the free vibration of a rotating laminated composite beam with a single delamination. The rotary inertia and shear deformation effects, as well as the bending–extension, bending–twist and extension–twist coupling terms are taken into account in the FE model. Comparison between the numerical results of the present model and the results published in the literature verifies the validity of the present model. Furthermore, the effects of various parameters, such as delamination size and location, fiber orientation, hub radius, material anisotropy and rotating speed, on the vibration of the beam are studied in detail. These results provide useful information in the study of the free vibration of rotating delaminated composite beams.

Sakar et al. [16] presents a finite element model for the static and dynamic stability of a rotating pretwisted aerofoil cross-section two bladed packet subjected to uniform radial periodic force. The effects of various parameters such as shroud dimensions, pretwist angle, stagger angle, rotational speed and distance of shear center from the centroid on the stability of the blade packets are presented. The numerical results show that pretwist angle and the coupling effect are important in high-frequency modes depending on shear center distance from the centroid on dynamic stability regions. The increase in stagger angle makes the pretwisted two-bladed packet less stable. However, the increase in rotational speed makes the pretwisted two-bladed packet more stable.

Stoykov et al. [17] studied the nonlinear vibrations of 3Dbeams with rectangular cross section and that rotate about a fixed axis are investigated by the p version finite element method. Two types of nonlinearity are taken into account: one comes from then online are strain–displacement relation; the other appears because of the inertia forces due to the rotation of the beam.

2.3 Behavior of undamaged and damaged composite blade in rotating condition:

Librescu et al. [18] described a geometrically non-linear theory to study the dynamic behavior of a thin-walled composite beam. The model is based on a small strain and large rotation and displacements theory, which is formulated through the adoption of a higher-order displacement field and takes into account shear flexibility (bending and warping shear). In the analysis of a weakly nonlinear continuous system, the Ritz's method is employed to express the problem in terms of generalized coordinates. Then, perturbation method of multiple scales is applied to the reduced system in order to obtain the equations of amplitude and modulation. In this paper, the non-linear 3D oscillations of a simply-supported beam are examined, considering a cross-section having one symmetry axis. Composite is assumed to be made of symmetric balanced laminates and especially orthotropic laminates. The model, which contains both quadratic and cubic non-linearity's, is assumed to be in internal resonance condition. Steady-state solution and their stability are investigated by means of the Eigenvalue of the Jacobin matrix. The equilibrium solution is governed by the modal coupling and experience a complex behavior composed by saddle noodle.

Chung et al. [24] has introduced a non-linear model for dynamic analysis of rotating thin-walled composite beams. The theory is deduced in the context of classic variation principles and the finite element method is employed to discretize and furnish a numerical approximation to the motion equations. The model considers shear flexibility as well as non-linear inertial terms, Coriolis effects, among others. The clamping stiffness of the beam to the rotating hub is modeled through a set of spring factors. The model serves as a mean deterministic basis to the studies of stochastic dynamics, which are the objective of the present article. Uncertainties should be considered in order to improve the predictability of a given modeling scheme. In a rotating structural system, uncertainties are present due to a number of facts, namely, loads, material properties, etc. In this study the uncertainties are incorporated in the beam-to-hub connection (i.e. the connection angle and the springs) and the rotating velocity. The probability density functions of the uncertain parameters are derived employing the Maximum Entropy Principle. Different numerical studies are

conducted to show the main characteristics of the uncertainty propagation in the dynamics of rotating composite beams.

Yongsheng et al. [25] described Smart structure with active materials embedded in a rotating composite thin walled beam is a class of typical structure which is using in study of vibration control of helicopter blades and wind turbine blades. The dynamic behavior investigation of these structures has significance in theory and practice. However, so far dynamic study on the abovementioned structures is limited only the rotating composite beams with piezoelectric actuation. The free vibration of the rotating composite thin walled beams with shape memory alloy (SMA) fiber actuation is studied. SMA fiber actuators are embedded into the walls of the composite beam. The equations of motion are derived based on Hamilton's principle and the asymptotically correct constitutive relation of single cell cross section accounting for SMA fiber actuation. The partial differential equations of motion are reduced to the ordinary differential equations of motion by using the Galerkin's method. The formulation for free vibration analysis includes anisotropy, pitch and precone angle, centrifugal force and SMA actuation effect. Numerical results of natural frequency are obtained for two configuration composite beams. It is shown that natural frequencies of the composite thin walled beam decrease as SMA fiber volume and initial strain increase and the decrease in natural frequency becomes more significant as SMA fiber volume increases. The actuation performance of SMA fibers is found to be closely related to the rotational speeds and ply angle.

Bao et al. [26] derived an element stiffness matrix of a beam with a crack from an integration of stress intensity factors, and then a finite element model of a cracked beam is established. This model is applied to a cantilever beam with an edge-crack, and the Eigen frequencies are determined for different crack lengths and locations. Finally, a simple and direct method for determining the crack position, based on the relationship between the crack and the Eigen couple (Eigenvalue and eigenvector) of the beam, is proposed and this method can be suggested to complex structures with various cracks, if their stress intensity factors are known to us.

Zak et al. [28] discussed the theories of beam and flexural behavior is compared. This analysis includes various one-, two- and three-dimensional beam behavior theories comprising the classical one-dimensional Bernoulli, Bernoulli– Rayleigh,

Timoshenko and Reddy theories, as well as various higher order and/or higher-mode theories of beam flexural behavior developed by the authors. The dispersion curves obtained by the use of Hamilton's principle and associated with each theory discussed in the paper have also been presented and analyzed. The wide investigation programme carried out by the authors aimed at showing major differences and similarities between the beam theories and to discuss various numerical aspects of their application. Great attention has been paid on properties, limitations as well as difficulties associated with the use of particular theories of beam flexural behavior. Based on a wide program on numerical calculations, the authors draw certain general conclusions that are valid not only in the field of wave propagation related problems, but also in the field of dynamics of engineering beam-like structures.

Banerjee at al. [29] described the Cracks reduce the service life of structures. A crack in a structural member introduces local flexibility that would affect vibration response of the structure. Both the mode shape and frequency change significantly due to the presence of crack. The objective of this paper is to obtain information about the location and depth of transverse open multiple cracks in a rotating cantilever beams. Vibration parameter in the form of mode shape of damaged rotating beam is obtained using finite element simulation. Using fractal dimension of mode shape profile, damage is detected. It is also shown that this method can produce satisfactory results with some limitation based on profile.

Tahani et al. [30] presented Material discontinuity could cause in-plane stress gradients that it arises inter laminar stresses in regions of sudden transition of material properties. A layer wise laminated beam theory that is a modification of a layer wise laminated plate theory is developed and it is used to analyze analytically the inter laminar stresses at material discontinuities in rotating composite beams. Equations of motion are obtained by using Hamilton's principle. It is assumed that the beam is divided into two regions with different layups which are joined together. The predicted inter laminar stress distributions at the ply interfaces are shown to be in good agreement with comparative three-dimensional finite element analysis.

2.5 Summary:

The literature review is carried out in this chapter. A lot of research has been done on composite box beams, both experimentally and numerically and analytically. The literature study is done in four section mentioned above. Most of the numerical studies are carried out on composite material or beams. By taking the references of it; I have carried out the experimentations on composite box beam.

Chapter 3

Design and Fabrication of Composite Blade

3.1 Details of Composite Blade:

For manufacturing of composite blade some design parameters are required. The 3D drawing of blade, its dimensions, and material properties is given below.

Table 3.1 Dimensions of composite blade

Parameters	Dimensions (mm)
Length	800
Width	60
Height	22
Thickness	4

With the help of above mentioned dimensions, 3D drawing is created in the AutoCAD. The lay-up sequence of composite blade is [0₃/90]s - 8 Layer.

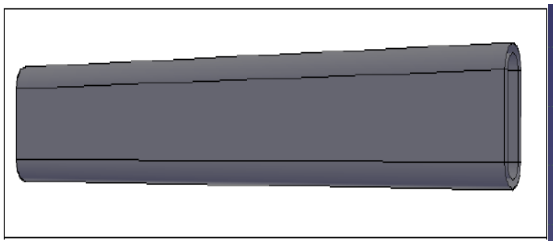


Figure 3.1 3D drawing of composite blade

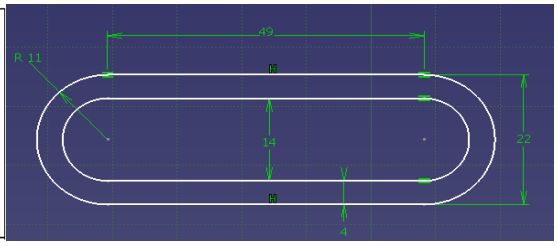


Figure 3.2 Front view of composite blade

The material properties of carbon fiber composite blade used for experimental and theoretical analysis are given below. Also material used for blade and lay up sequence of geometry is given. Same properties are used during numerical study or simulation of composite blade.

3.1.1 Material:

- Carbon Fibre Unidirectional Fabric
- 6 KUD Fabric – 360 GSM

3.1.2 Layup Sequence:

- 0-0-90-0-0-90-0-0 - 8 Layer Geometry

3.1.3 Material Properties:

Table 3.2 Material Properties of Composite blade

Material Properties	Carbon Fibre Unidirectional
Young's Modulus	135 Gpa (Ex Dir.)
	10 Gpa (Ey Dir.)
	10 Gpa (Ez Dir.)
Poisson's Ratio	0.26
Mod. of Rigidity	5 Gpa
Density	1600 kg/m^3

3.2 Fabrication of composite blade

Composite materials are formed by combining two or more materials that have quite different properties. The different materials work together to give the composite unique properties, but within the composite you can easily tell the different materials apart – they do not dissolve or blend into each other. Most composites are made up of just two materials. One material (the matrix or binder) surrounds and binds together a cluster of fibers or fragments of a much stronger material (the reinforcement).

3.2.1 Choosing materials for the reinforcement:

The composite blade used in the experimentation is having the **carbon fiber as reinforcement.** Although glass fibers are by far the most common reinforcement, many advanced composites now use fine fibers of pure carbon. Carbon fibers are much stronger than glass fibers, but are also more expensive to produce. Carbon fiber composites are light as well as strong. They are used in aircraft structures and in sporting goods (such as golf clubs), and increasingly are used instead of metals to repair or replace damaged bones. Carbon Fibre, Standard grade carbon fiber (T300, HTA, etc) have mechanical properties without resin of approx. 3-3.5 GPa tensile strength and 230 - 240 GPa Tensile modulus, is used for the manufacturing purpose.

3.2.2 Choosing materials for the matrix

For the matrix, many modern composites use thermosetting or thermo softening plastics (also called resins). (The use of plastics in the matrix explains the name 'reinforced plastics' commonly given to composites). The plastics are polymers that hold the reinforcement together and help to determine the physical properties of the

end product. Two main kinds of polymers are thermosets and thermoplastics. Thermosets have qualities such as a well-bonded three-dimensional molecular structure after curing. They decompose instead of melting on hardening. For the fabrication of the carbon fiber composite box beam used in the experimentation **Epoxy is used as a matrix** which is type of thermosets polymer. Epoxy resins are widely used in filament-wound composites and are suitable for moulding prepress. They are reasonably stable to chemical attacks and are excellent adherents having slow shrinkage during curing and no emission of volatile gases. These advantages, however, make the use of epoxies rather expensive.

Following table shows the material properties of the carbon fiber epoxy resin used for the fabrication of the composite box beam.

Table 3.3 Details of T300/5208 Carbon/Epoxy Unidirectional

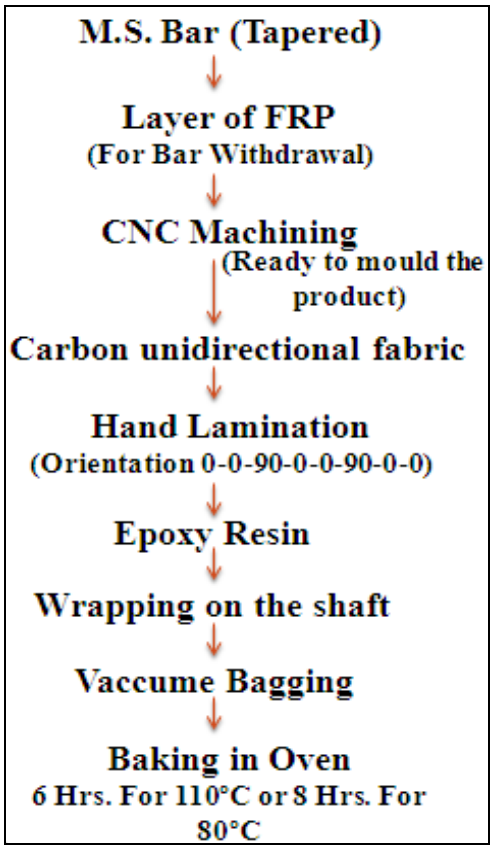
Fiber	Matrix	Form	V_f	Rho(g/cc)	Temp(^{0}C)	Cond.
T300 Carbon	5208 Epoxy	UD	0.70	1.60	22.2	Dry

3.2.3 Choosing the manufacturing process:

Making an object from a composite material usually involves some form of mould. The reinforcing material is first placed in the mould and then semi-liquid material is sprayed or pumped in to form the object. Pressure may be applied to force out any air bubbles, and the mould is then heated to make the matrix set solid.

a) Vacuum Bag Molding:

Today bag molded (vacuum and pressure) composites provide higher performance that results from optimization of process controls, design refinements and improved materials. Vacuum bagging techniques have been developed for fabricating a variety of aerospace components and structures. The process is principally suited to prepreg materials. This method utilizes a flexible film or rubber bag that covers the part layup. The bag permits evacuation of the air to apply atmospheric pressure. The primary limitation of this method is the limited pressure that can be applied. The fabrication process of composite box beam is given below in detail.





Carbon Fibre



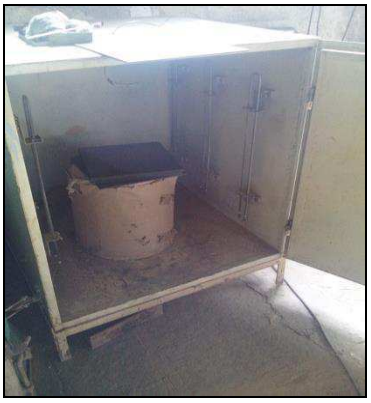
CNC Machining



Hand Lamination



Vaccume Bagging



Baking Oven

Figure 3.3 Fabrication process of composite blade

3.3 Summary:

In this study the composite blade is used for analysis in different conditions. The details of blade are explained in this chapter. Dimensions, material used for particular beam, its layup sequence, and material properties are also given in detail. Then, the fabrication process of composite material is also explained in detail with experimental setups. The Vaccume Bagging is one the process which is mostly used for composite blade fabrication.

Chapter 4

Experimental Analysis of Composite Blade in Static Condition

In this study static analysis is carried out for composite blade to find out the tip defection of the blade by applying load at its free end. For that blade is fixed like a cantilever beam. For applying the load at free end, we have used the different weights (10N to 80N). This particular study has carried out to find the material uncertainty present in material or in beam. The experimental study has carried for deflection The details of this entire are discussed below. [5]

4.1 Experimental Study for Deflection measurement of blade:

The experimental study is carried out for composite blade to measure it's deflection at free end. The composite blade is like a cantilever beam, where one end is fixed and at the other end load is applied. Due to this load deflection is take place at free end of beam. This parameter is used to find the material uncertainty present in material or in beam. In previous study deflection is calculated using Dial Gauge. The dial gauge is placed at bottom side of beam by making it's stylus in point contact with blade and will shows zero reading. If load is applied at free end of the beam will move in downward direction. Due to point contact of beam with stylus it also moves and shows some reading. The change in reading is directly taken as deflection of blade in mm or cm. But due to some contact between them will create instrumental errors during measurement.

To avoid this situation non contact device is developed called as Hall Effect Sensor. The Hall Effect sensor is electronic device which is works on electromagnetic field. If magnet is come in front of Hall Effect sensor it create magnetic field between them. If magnet will moves away from it change in voltage will take place due to change in distance between them. The change in voltage is calibrated in terms of deflection of blade. Therefore, in this study magnet is stick on blade at its free end and Hall Effect sensor is mount on its top side by keeping some distance between them i.e. 1 to 2 mm. The output of this sensor is to another electronic device named as Arduino (Uno) will give required output only.

The details of this two devices and its operation for our study is discussed below along with its setup for different loading conditions. The Experimental setup for deflection of blade at free end is show below.



Figure 4.1 Experimental setups for Deflection measurement of blade using Hall Effect sensor

4.1.1 Introduction to Hall Effect Sensor:

The Hall Effect is an ideal sensing technology. The Hall element is constructed from a thin sheet of conductive material with output connections perpendicular to the direction of current flow. When subjected to a magnetic field, it responds with an output voltage proportional to the magnetic field strength. The voltage output is very small (μV) and requires additional electronics to achieve useful voltage levels. When the Hall element is combined with the associated electronics, it forms a Hall Effect sensor.

Although the Hall Effect sensor is a magnetic field sensor, it can be used as the principle component in many other types of sensing devices (current, temperature, pressure, position, etc.). Hall Effect sensors can be applied in many types of sensing devices. If the quantity (parameter) to be sensed incorporates or can incorporate a magnetic field, a Hall sensor will perform the task. Figure 2 shows a block diagram of a sensing device that uses the Hall Effect. In this generalized sensing device, the Hall sensor senses the field produced by the magnetic system. The magnetic system responds to the physical quantity to be sensed (temperature, pressure, position, etc.) through the input interface. The output interface converts the electrical signal from the Hall sensor to a signal that meets the requirements of the application.

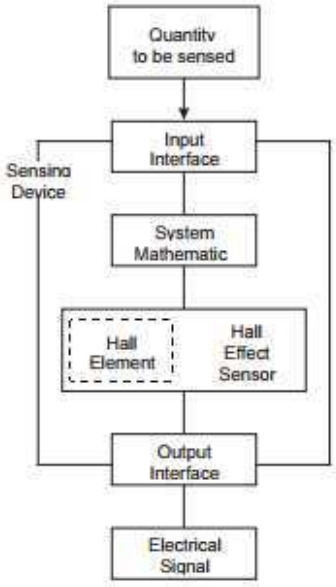


Figure 4.2 General sensor based on the Hall Effect

4.1.2 Why use the Hall Effect?

The reasons for using a particular technology or sensor vary according to the application. Cost, performance and availability are always considerations.

General features of Hall Effect based sensing devices are:

- True solid state
- Long life
- High speed operation - over 100 kHz possible
- Operates with stationary input (zero speed)
- No moving parts
- Logic compatible input and output
- Highly repeatable operation

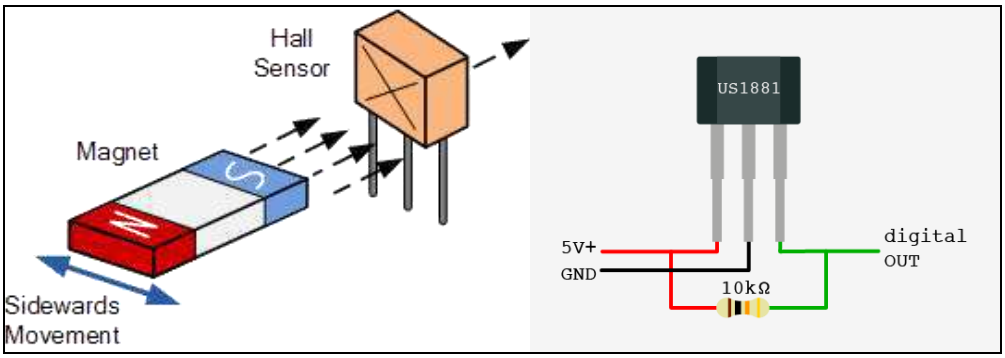


Figure 4.3 Principle of Hall Effect Sensor

4.1.3 Introduction to Arduino:

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

The Uno is one of the more popular boards in the Arduino family and a great choice for beginners. We use the Arduino Uno for our study and the configuration of it as shown in figure below.

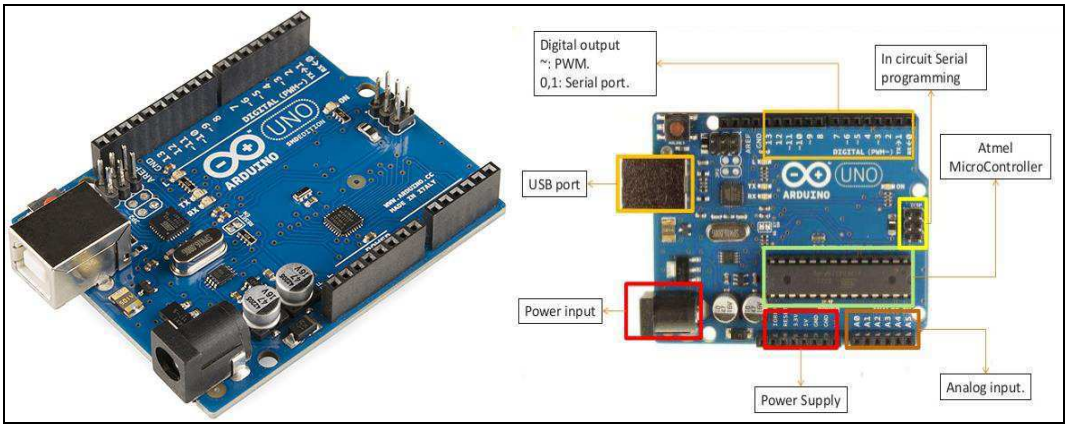


Figure 4.4 Arduino UNO with connections

Some of the key features of the Arduino Uno include:

- An open source design. The advantage of it being open source is that it has a large community of people using and troubleshooting it.
- Very convenient power management and built-in voltage regulation. You can connect an external power source of up to 12v and it will regulate it to both 5v and 3.3v. It also can be powered directly off of a USB port without any external power.
- And last, but not least, a button to reset the program on the chip.

4.1.4 Experimental Results for different loads:

The experimental results are carried out for deflection of blade at free end for different loads using Hall Effect sensor. The same study is carried out for four composite blade to find material uncertainty present in material using deflection parameter. The experimental setup for this study is shown by figure. Hall Effect sensor will give maximum voltage up to 220 volt, if distance between sensor and magnet is up to 6 mm. Initially, I put 1 mm distance between sensor and magnet then it shows some constant voltage i.e. 460-465 volt and it is assumed as zero. When 10 N load is applied at free end of the blade distance between them is increases and voltage is varied from 464 volt to 480 volt is shown by the graphs and voltage difference is 16 volt after loading. The change in voltage difference is calibrated in terms of deflection of blade. The same process is carried out for other loads (20N to 80N) and its voltage differences are calculated using graphs to find deflection of blade.



Figure 4.5 Composite box blade in unloading and loading condition

If blade is deflected up to 6 mm from its initial position then 220 volt maximum voltage is generated. For 10 N load 16 v voltage generated and using that voltage I have required to calculate how much blade is deflected for that particular load? The same process has carried on four blade. The sample calculations of first blade for 10 N and 20 N loads are given below.

1) **Sample calculation for 10 N:**

$$\frac{6\text{ mm}}{220\text{ V}} = \frac{\delta}{16\text{ V}}$$

Therefore,

$$\delta = 0.43\text{ mm}$$

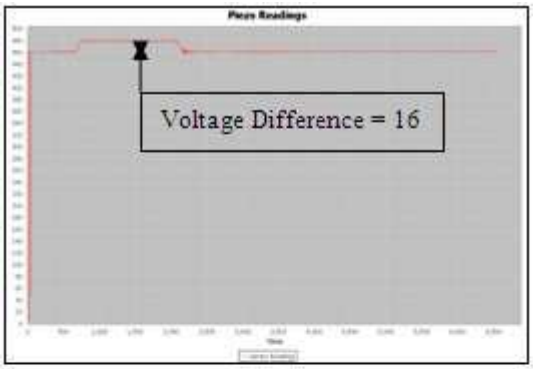
2) Sample calculation for 20 N:

$$\frac{6\text{ mm}}{220\text{ V}} = \frac{\delta}{25\text{ V}}$$

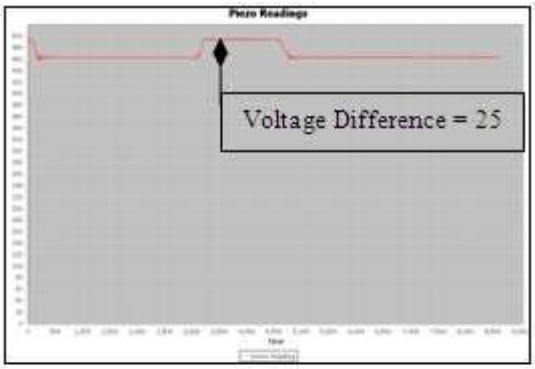
Therefore,

$$\delta = 0.68\text{ mm}$$

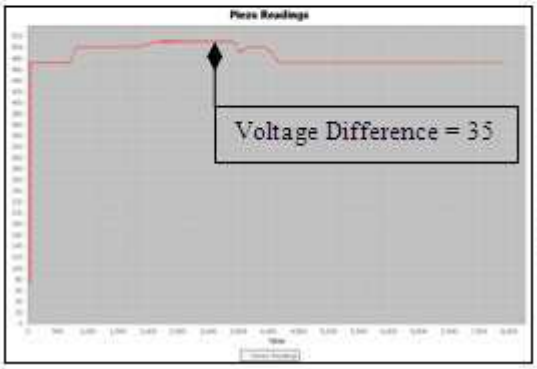
By the same process deflection is found out for other loads and remaining three blade. The voltage difference in initial and final reading for different loads is shown by following graphs. The following graphs are generated during the experimentation of first blade. The same voltage differences are calculated for remaining three blade by generating the same graphs to find its deflection for different loads.



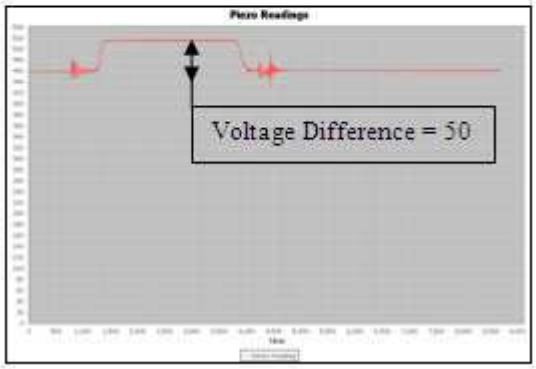
10 N



20 N



30 N



40 N

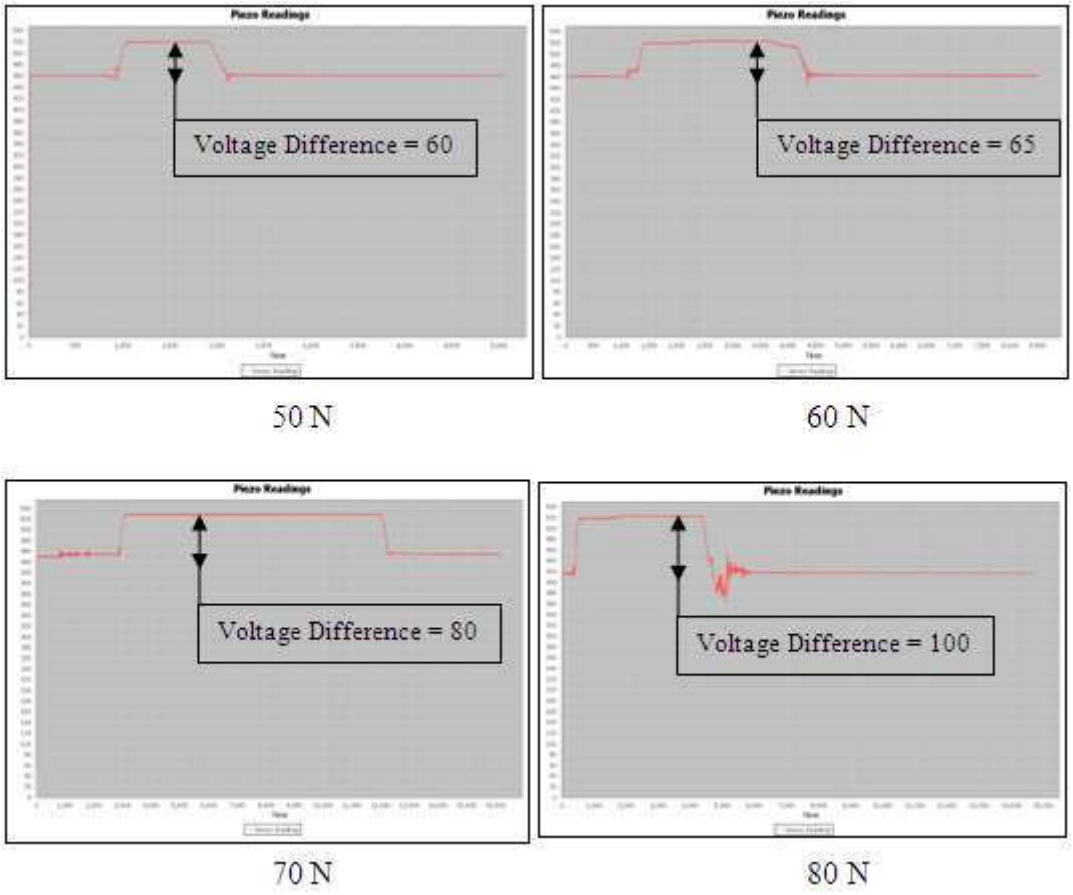


Figure 4.6 Voltage difference in initial and final reading of first blade for different loads

Following table represents voltage difference of four composite blade along with its free end deflection for different loads.

Table 4.1 Experimental Deflection of four blade with voltage differences for different loads

Sr. No.	Load (N)	Voltage difference between Initial & Final Reading				Experimental Deflection (mm)			
		Beam 1	Beam 2	Beam 3	Beam 4	Beam 1	Beam 2	Beam 3	Beam 4
1.	10	16	15	16	14	0.43	0.40	0.43	0.38
2.	20	25	25	23	27	0.68	0.68	0.62	0.73
3.	30	35	37	35	36	0.95	1.00	0.95	0.98
4.	40	50	48	51	50	1.36	1.30	1.39	1.36
5.	50	60	61	62	58	1.63	1.66	1.69	1.58
6.	60	65	65	63	62	1.77	1.77	1.71	1.69
7.	70	80	81	79	82	2.18	2.20	2.15	2.23
8.	80	100	102	102	98	2.72	2.78	2.78	2.67

The experimental results of deflection of four blade for different loads are also shown by following graph. The deflection is gradually increased with increasing load.

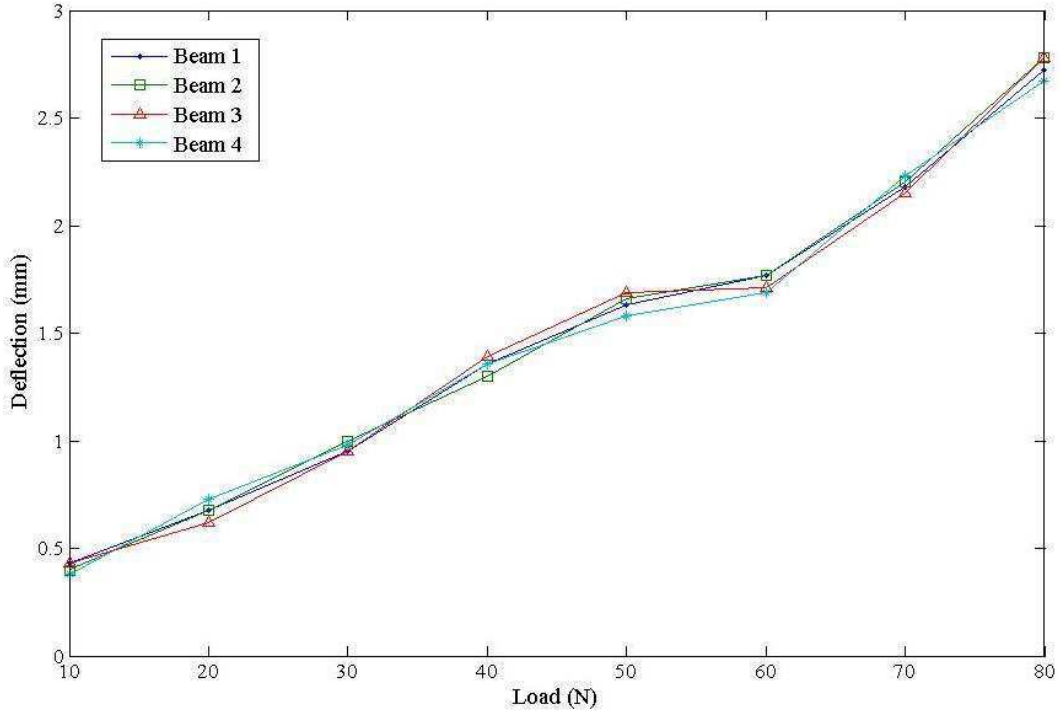


Figure 4.7 Graph of Load Vs Deflections for Four composite blades

Chapter 5

Experimental study on the Behavior of Rotating Composite Blade in Undamaged and Damaged Condition

5.1 Overview:

The experimental analysis is carried out on undamaged and damaged composite blade in rotating condition for different rpm. The Vertical Load Balancing Machine is used for this study. The detail specifications of that machine are given below. Also the Telemetry Strain Data Acquisition System is used for strain data transformation which is wireless device mounted on balancing machine. Initially, experimental results are found for undamaged blade for different rpm at different locations like near root, at mid and at tip. Then blade is damaged near root, at mid and at tip by producing cracks. The experimental results are represented in graphical form to analyze the behavior at different locations. Finally, results are compared for undamaged and damaged blade for different rpm. [36] [37]

5.2 Experimental Study:

The experimental setup for rotating condition analysis of composite blade is shown below. The balancing machine is fixed at location, the composite blade are mounted on balancing plate which is rotating for different rpm on which strain data acquisition system is also mounted. The detailed specifications of the instruments used for analysis are given below.



Figure 5.1 Experimental setup for Rotating Analysis of Composite Blade

5.2.1 Specifications of Vertical Load Balancing Machine:



Figure 5.2 Balancing Machine with control panel

- Max Weight of Rotor: 30kg
- Max Diameter of Rotor: 1.5m
- Speed of Rotor: 300 rpm to 1000 rpm variable speed
- Digital control system
- Computerized control panel for measurement of angle and unbalanced mass

5.3 Free Vibration Analysis of Rotating Composite Blade using GY-521 Accelerometer:

This study deals with free vibration analysis of composite blade which is rotating at different rpm. The analysis has carried out by considering the accelerations as output parameters. The experimental has designed and developed to carry out analysis on rotating blade. Also for accelerations measurement the setup is developed using GY-521 Accelerometer and Arduino. In this analysis the accelerometer has kept on composite blade and rotates it for different rpm. During rotating condition accelerations are taken in three directions (i.e. X, Y and Z) for each rpm using that proposed setup and are represented in graphical form to analyze free vibrations for rotating blade by estimating the accelerations.

This particular analysis has carried out on both undamaged and damaged condition of composite blade. Initially, experimentation has carried out in undamaged

condition of blade and after that blade is damaged by producing crack at different locations like near root, at mid and at tip. Then same experimentation has carried out on damaged beam. Then both acceleration results are represented in graphical form to analyze the effect of damage on accelerations of rotating blade for different rpm. Also this study is useful to analyze the behavior of rotating blade in undamaged and damaged condition using the same parameter. The experimental setup for the above study is shown by following figures.

5.4 Experimental setup for Acceleration measurement:

The experimental setup for acceleration measurement in rotating condition is shown below. During analysis blade is mounted on rotating disk then the accelerometer (GY-521) in mounted on free end of rotating blade and is connected with Arduion setup which is also fixed on rotating disk. The blade is rotating for different rpm (100 rpm to 500 rpm) and acceleration are measured to this rpm's. By using this particular setup both undamaged and damaged analysis has carried on composite blade.



Figure 5.3 Experimental setup for acceleration in rotating composite blade using GY-521 Accelerometer

5.4.1 Accelerometer GY-521:

In this analysis we have developed one accelerometer using GY-521 and Arduion setup for measurement of accelerations in rotating condition. The Gy-521 is

mounted on rotating blade at its free end as shown in figure below and connected with wires to Arduion. It will take 5 volt supply from Arduion.

In rotating condition the GY-521 will capture the accelerations in three direction and this all analog data to Arduion then Arduion will convert that data in digital data and stored it in SD card.



Figure 5.4 Accelerometer GY-521 mounting on free end of composite blade

5.4.2 Arduino Setup:

The Arduion setup connected with accelerometer is shown by following figure. In this setup the battery (5 Volt) is used to give the supply to Arduion and one SD card setup is also connected with it. The Arduion will receive the data from GY-521 and stores it in SD card in digital form from which further graphs are drawn.

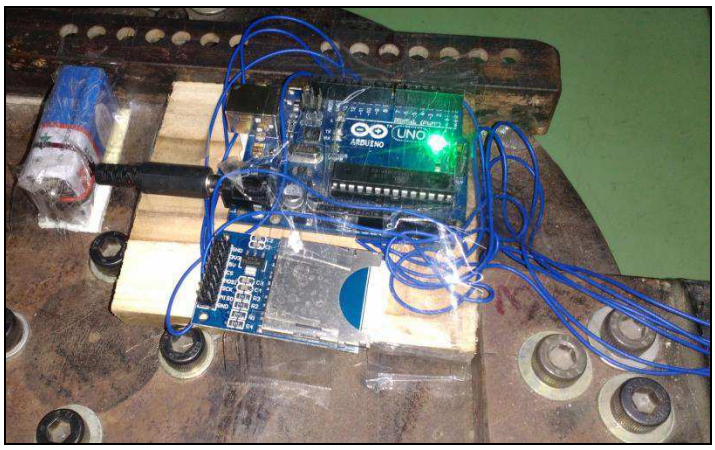


Figure 5.5 Arduino setup connected with GY-521 Accelerometer

5.5 Acceleration in rotating composite blade for different rpm in different directions:

The experimentation has carried out on rotating composite blade to measure the accelerations for the different rpm. In this analysis we have developed the accelerometer using GY-521 and Arduino setup. The experimental setup for this particular study is shown by the above figures. The blade mounted on rotating disk and rotating it for different rpm and using that proposed setup the accelerations are measured. Here we required to find the accelerations of rotating blade in terms of g value because direct reading of sensor are not considered as accelerations, we want make some conversions or calculations to obtain requires results only. The values obtained from the GY-521 accelerometer or raw values are used to find the ax, ay, az in terms of g value. For our GY-521, acceleration seems to be in limit of 2g. So, scaling factor = 16384. The scaling factor is depends on acceleration limit. The following table shows the scaling factors for acceleration limit as per standards available.

Table 5.1 Scaling factors for accelerometer values

Acceleration Limit	Sensitivity or Scaling factor
2g	16384
3g	8192
4g	4096
5g	2048

Converting the raw data:

$$\text{Required value or } (ax, ay, az) = \frac{\text{raw value}}{\text{Sensivity or Scaling factor}} \text{ (in g value)}$$

For example, in the first data, we got,

accel x, y, z: -31203, -1850, -3428

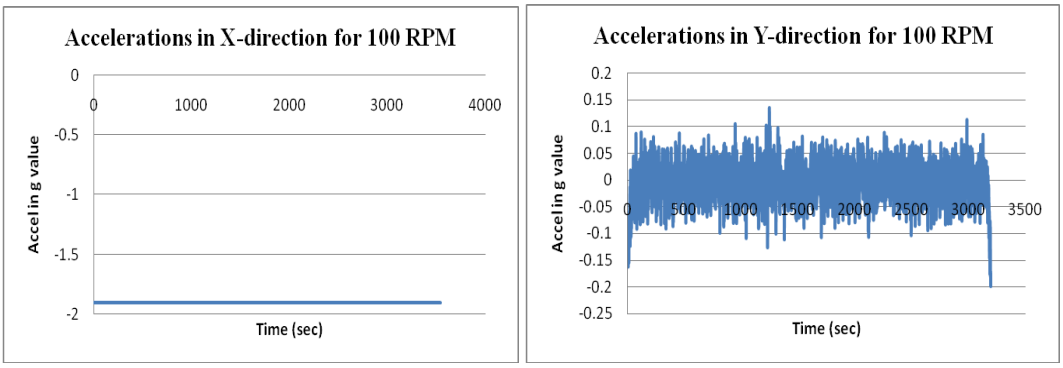
Therefore, from the formula the accelerations are found out by the following way:

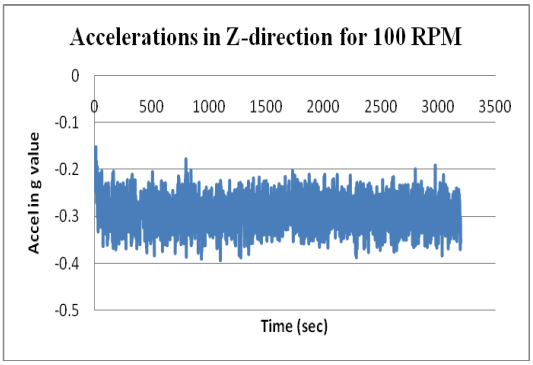
$$ax = \frac{-31203}{16384}g \qquad ay = \frac{-1850}{16384}g \qquad az = \frac{-3428}{16384}g$$

5.5.1 Accelerations in undamaged rotating composite blade for different rpm:

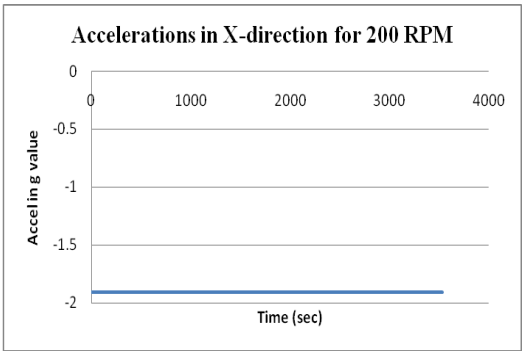
Initially, the experimentation has carried out on undamaged blade for different rpm. During the experimentation we got some raw data in three directions. Hence by using the above formula and scaling factor here we have calculated the accelerations in terms of g value. The graphical results for accelerations in terms of g value for different rpm are shown by the following graphs.

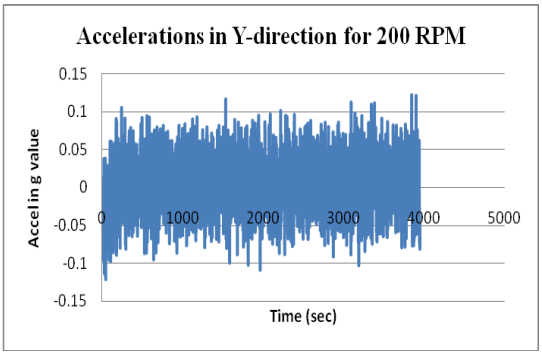
1. Accelerations for 100 rpm:

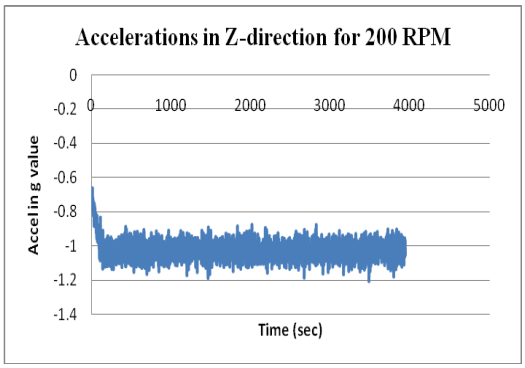




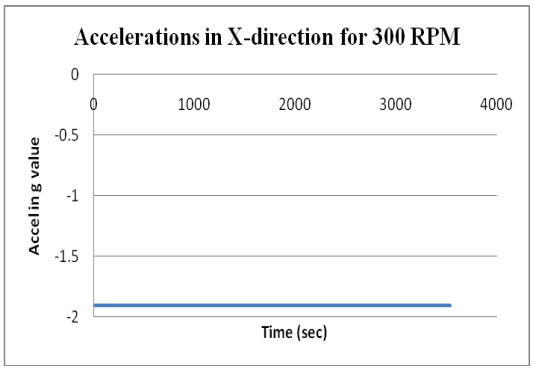
2. Accelerations for 200 rpm:

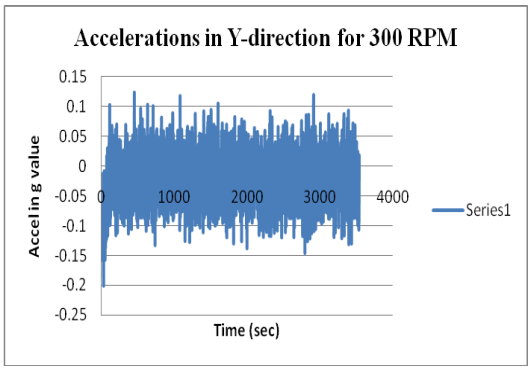


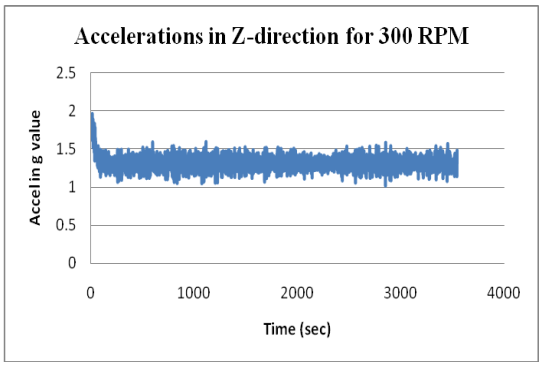




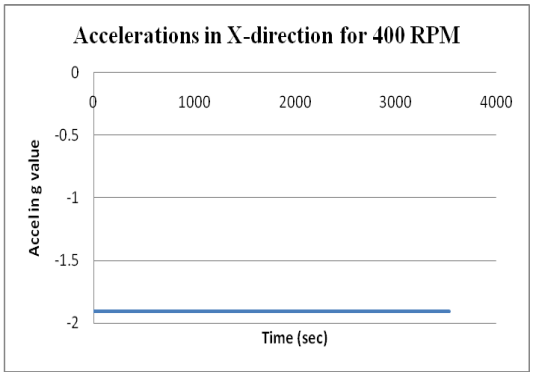
3. Accelerations for 300 rpm:

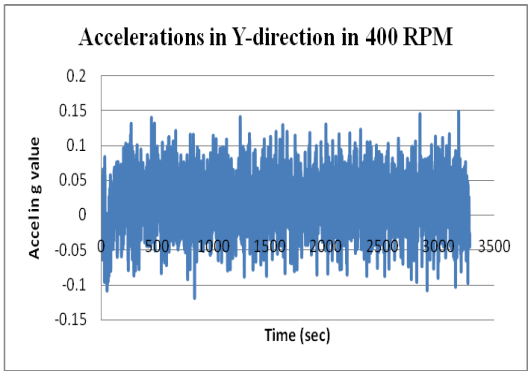


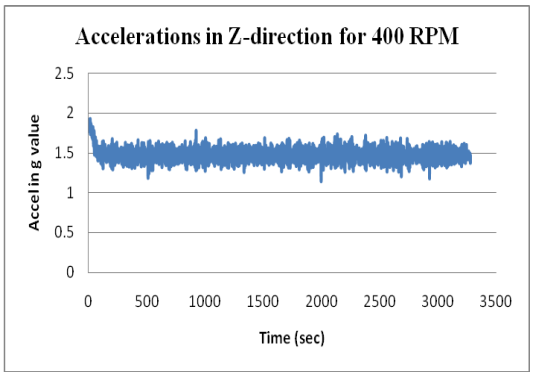




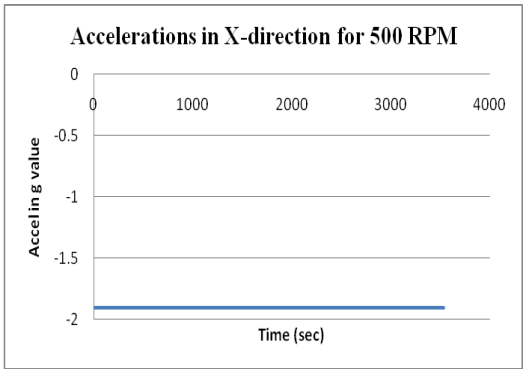
4. Accelerations for 400 rpm:

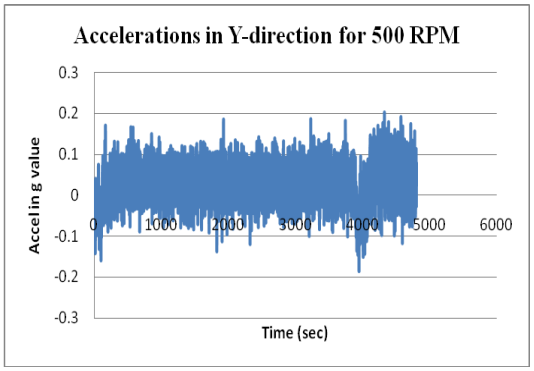






5. Accelerations for 500 rpm:





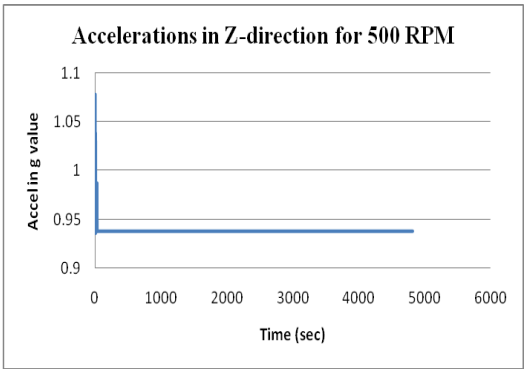


Figure 5.6 Accelerations in undamaged rotating composite blade for different rpm

The above graphical results are drawn for accelerations (in g value) in rotating composite blade for different rpm and in different directions (i.e. X, Y, and Z). The X direction represents axial direction, Y direction represents the horizontal rotating direction of beam and Z represents the vertical movement of blade in rotating condition. By making comparison between above results the following conclusions are drawn:

- If blade is rotating for some rpm then it has observed that there is zero acceleration in x-direction or in axial direction because the blade is rigid at

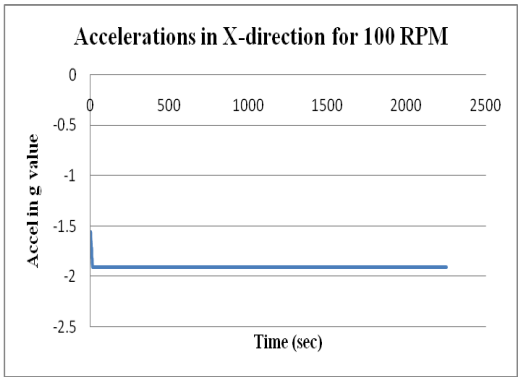
one direction so there is no any movement will take place in this direction. Also for all the remaining rpm (i.e. 100 to 500) same results are obtained in x-direction of rotating blade are shown by above figures.

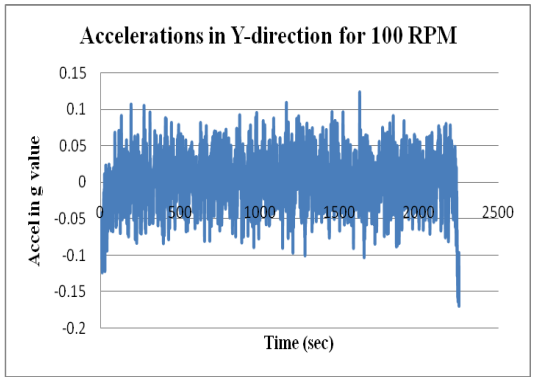
- From the above results in y-direction it has observed that the maximum accelerations are produced and they are continuously increases with increases with increase in rpm because in rotating condition of blade flapping will taking place in horizontal direction due to this flapping acceleration are produced in this direction. The accelerations are continuously produced in this direction for rotating beam. The results obtained during experimentation for the 100 to 500 rpm are represented by the figures.
- For rotating blade the vertical movement is also taking place and this is represented by z-direction. From the above results it is observed that up to certain rpm the accelerations are produced in z-direction due vertical movement of blade and after that there is no any acceleration in this direction after some rpm. From the above results we can say that for 100 to 400 rpm accelerations are produced in z-direction and if rpm is increases up to 500 rpm then zero acceleration are produced in blade because after some rpm the movement of blade will stopped in this direction.

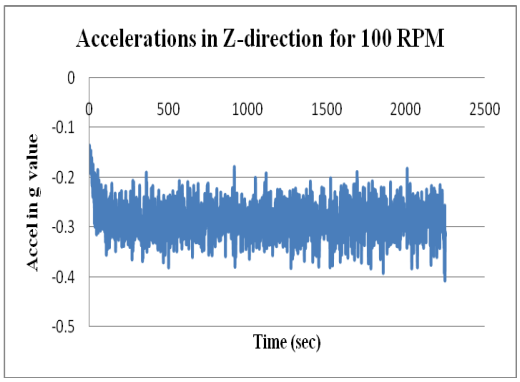
5.5.2 Accelerations in damaged rotating composite blade for different rpm:

The same experimentation has carried on undamaged to find the accelerations in rotating blade for different rpm. In this condition blade is damage at three locations by producing crack near root, at mid and at tip. The results are taken for different rpm and represented in graphical form in three directions such as X, Y, and Z.

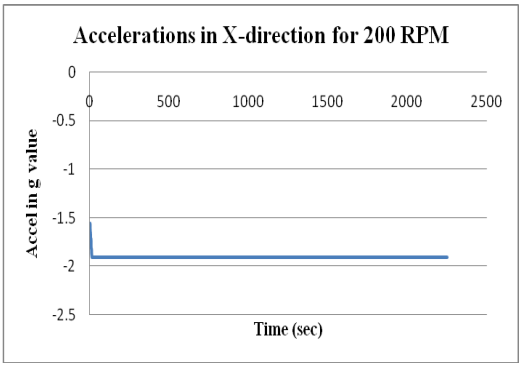
1. **Accelerations for 100 RPM:**

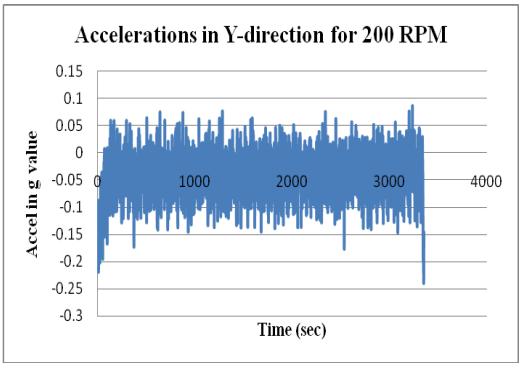


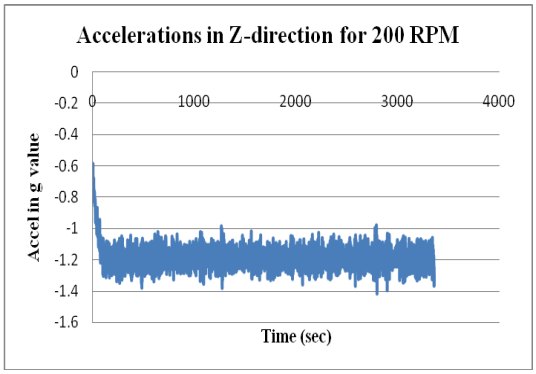




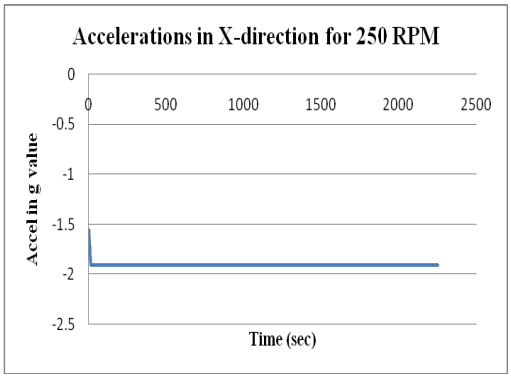
2. Accelerations for 200 RPM:

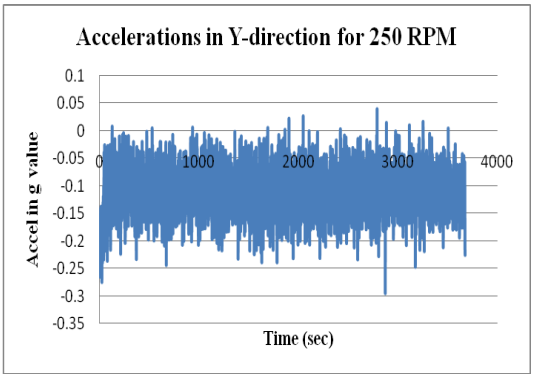


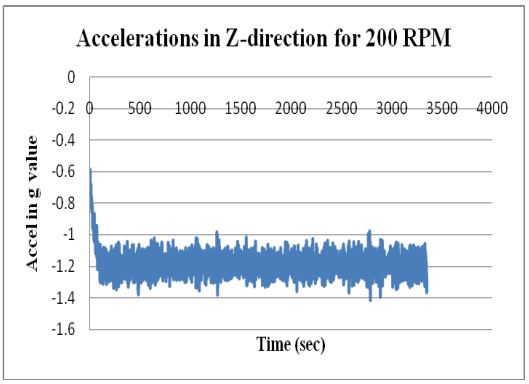




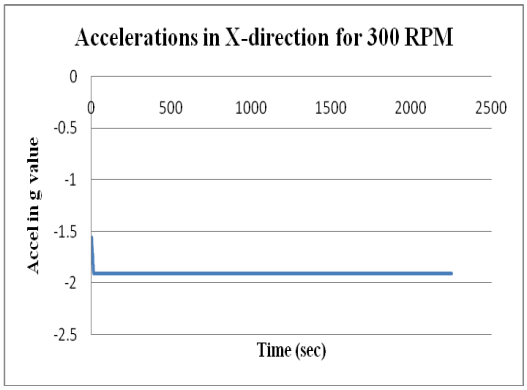
3. Accelerations for 250 RPM:

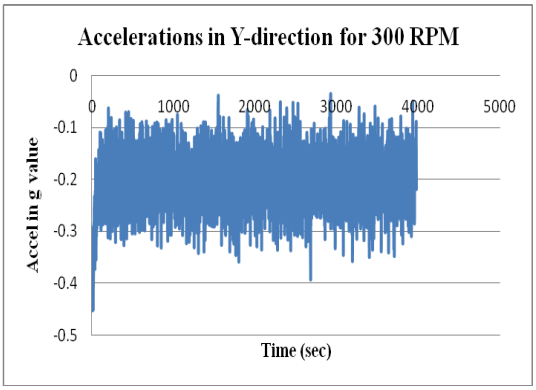


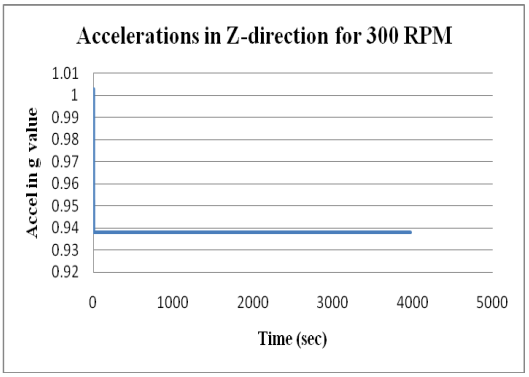




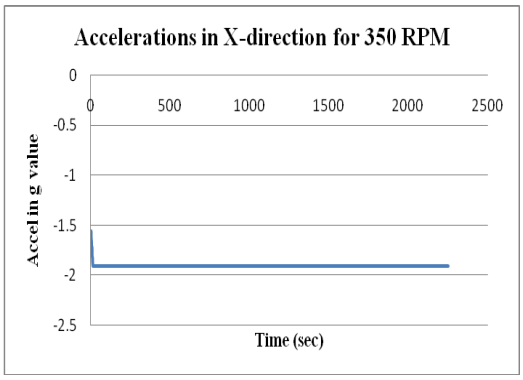
4. Accelerations for 300 RPM:

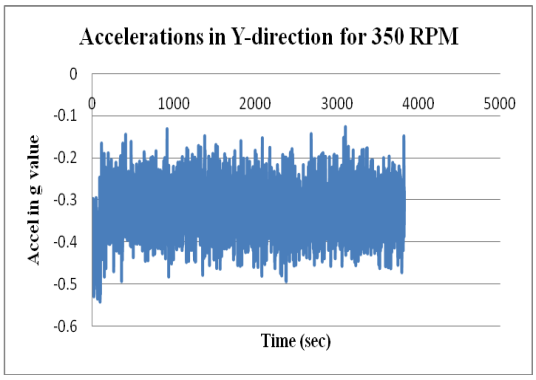


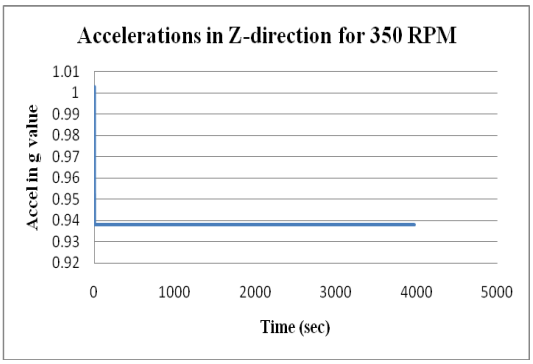




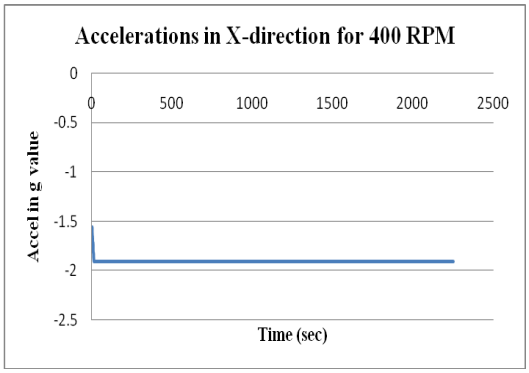
5. Accelerations for 350 RPM:

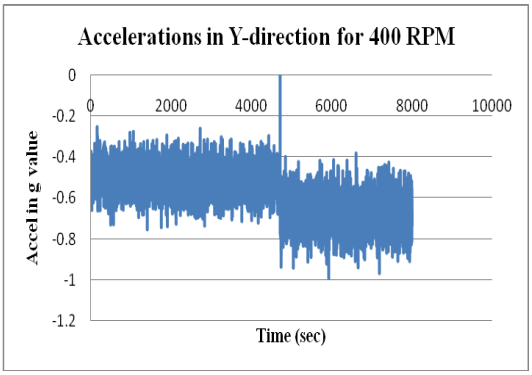


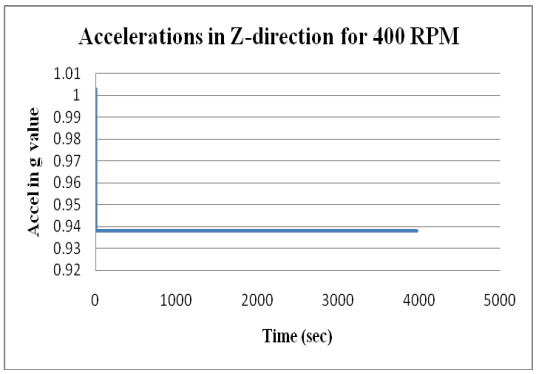




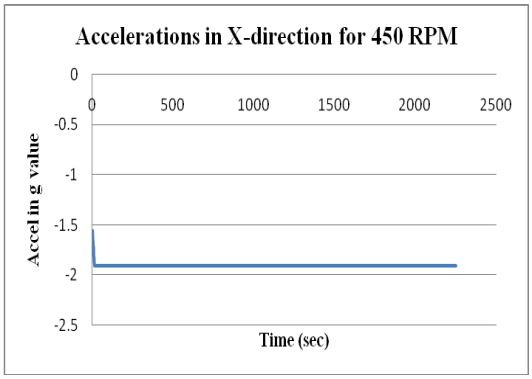
6. Accelerations for 400 RPM:

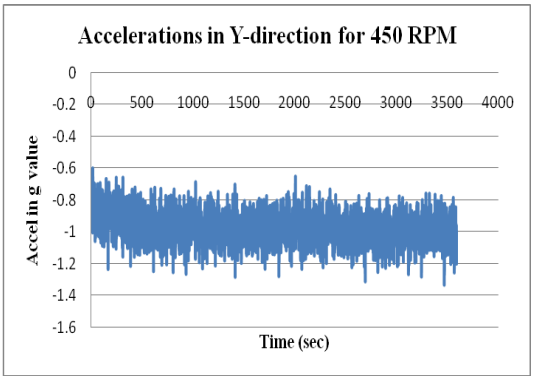


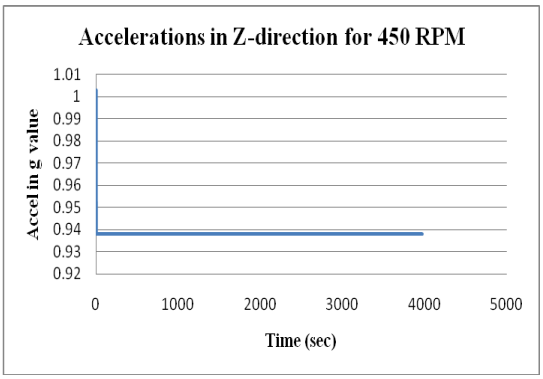




7. Accelerations for 450 RPM:







8. Accelerations for 500 RPM:

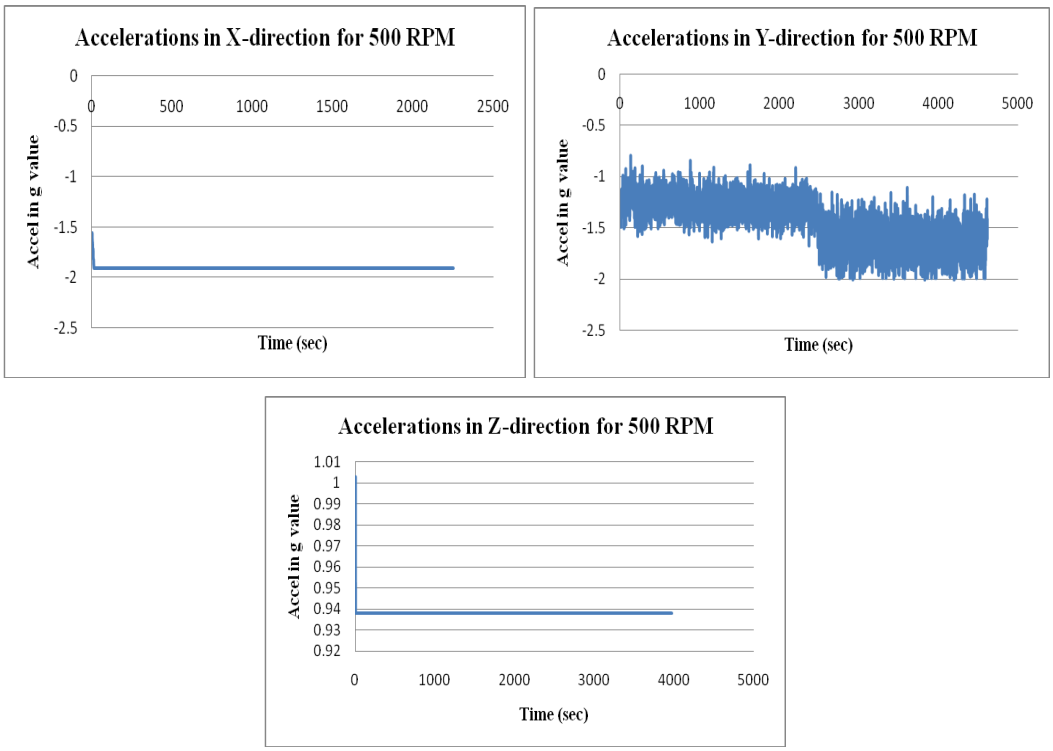


Figure 5.7 Accelerations in damaged rotating composite blade for different rpm

The above graphical results represent the accelerations in g value for damaged rotating composite blade for different rpm. From the above results the following conclusions are drawn:

- If damaged blade is rotating for some rpm the accelerations produced in it are same like accelerations in undamaged blade and it observed if both results are compared with each other for the particular rpm. There are no accelerations in X-direction.
- If rpm is increases continuously then system will get disturbed because maximum accelerations are produced in beam due to damaging of blade. The maximum changes are observed in accelerations for 350 to 450 rpm and it in the Y-direction only is shown by above graphs and in Z-direction the accelerations will remains constant after some rpm.
- The changes are observed for undamaged and damaged blade if all graphical results are compared with each other for this particular rpm.

From the above all results of undamaged and damaged blade it has that observed that maximum accelerations are produced in damaged blade. The maximum variations are

taking place in direction of Y. The following graphs represent the peak to peak variations for undamaged and damaged in Y and Z direction for the different rpm.

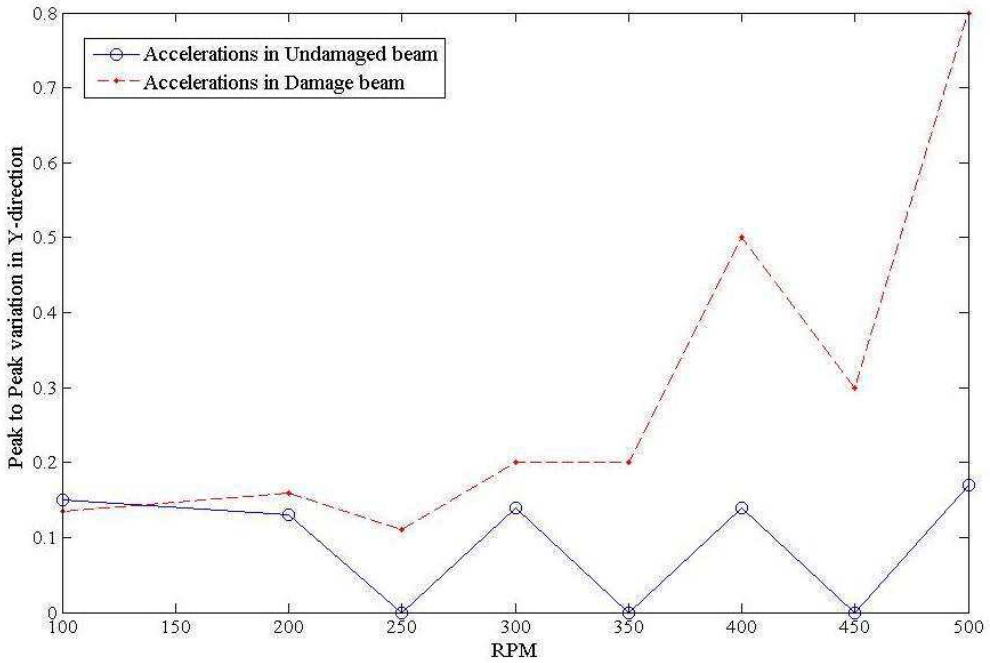


Figure 5.8 Graph of RPM Vs accelerations in undamaged and damaged beam for Y-direction

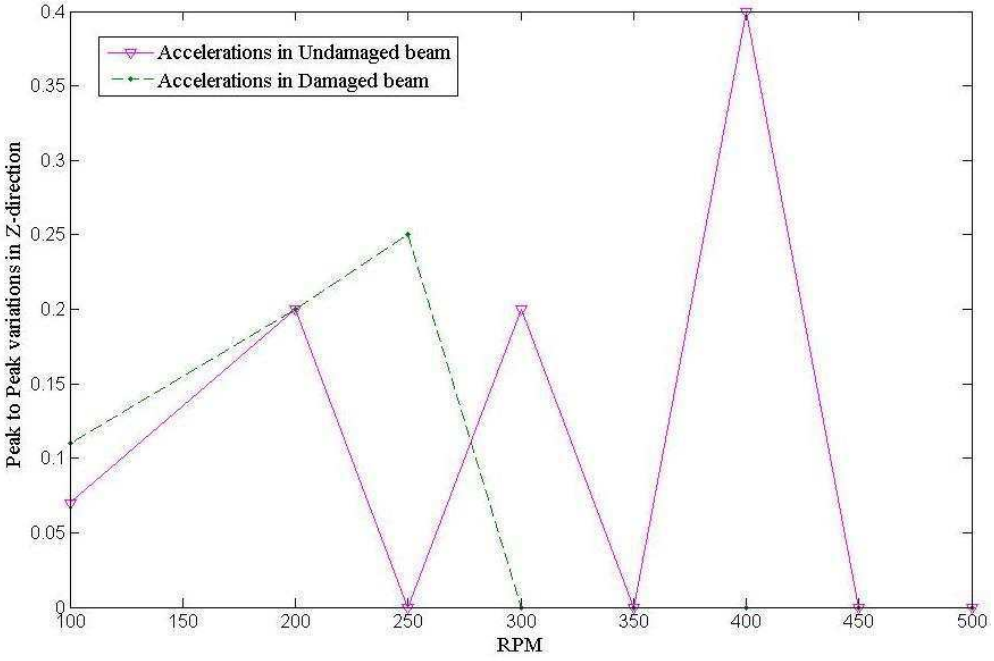


Figure 5.9 Graph of RPM Vs accelerations in undamaged and damaged blade for Z-direction

From the above graphs it is observed that peak to peak variation is maximum for damaged blade as compared to peak variation in undamaged blade for both Y and Z direction. The plane line indicates the accelerations for undamaged blade and dotted

line indicates the accelerations in damaged blade for different rpm. From this above graphs it has observed that the system (rotating system) will disturbed after damaging of blade because for damaged blade accelerations peaks are maximum as compared to undamaged blade in both Y and Z direction. There is no any acceleration in X-direction because the blade is rigid in this direction.

5.6 Summary:

In this chapter behavior of undamaged and damaged blade has analyzed for different rpm. Initially, experimentation has carried out on undamaged and damaged blade for different rpm to analyze its behavior at different locations. The experimental results are represented in graphical from to check the behavior of blade before damaging and after damaging at different locations. Then accelerations of rotating composite blade are analyzed using GY-521 and Arduion setup. The accelerations are calculated in terms of g value for both undamaged and damaged blade and finally results are represented in graphical form.

Chapter 6

Conclusion

Composite materials are widely used in the aircraft industries because of their superior fatigue characteristics and larger stiffness-to-weight ratios as compared with their metal counterparts. A composite material can be defined as a combination of two or more materials. In this thesis the static and dynamic analysis of composite blade has carried which is made up of unidirectional carbon fibers. Initially, static analysis is carried out on blade for the different parameters like deflection, stress and strain. Then dynamic analysis is carrying out on rotating beam to study its behaviour in undamaged and damaged condition for different rpm.

6.1 Conclusion:

Following conclusions are drawn from above study and work presented in this thesis:

- The experimentation has carried out on composite blade in static condition to find the deflection at its free end for different loads. It has been carrying out using Hall Effect Sensor which non contact device for deflection measurement. The deflection of blade at free end stress-strain values are increases continuously by increasing point load at its free end. This particular study was carrying out to find the uncertainties present in material by using deflection parameter and it is analyzed that there is no uncertainty present in material or in composite blades.

- In case of accelerations of rotating blade, the maximum accelerations are produced in damaged blade as compared undamaged blade. Due to this damaged blade the rotating system is disturbed at some particular rpm which is analyzed by the comparison between undamaged and damaged results.

6.2 Future work:

Future work can be focus on,

- There is wide scope to study the Natural Frequency of rotating composite blade for different RPM.
- The Fatigue Testing Analysis is also required to carry out on the rotating composite blade.

- Exploring use of PZT for acquiring signals for Structural Health Monitoring System.

References

[1] Vlasov V.Z., Vanegas J.D., Patino I.D., Bank L.C., "Shear coefficients for thin walled composite beams", Instituto Tecnologico Metropolitano, Calle 54 No 30-01. Colombia, Lat. Am. j. solids struct (10); 47-61, July (2013).

[2] Barradas C. J., Aníbal J. V., "Cross-section optimal design of composite laminated thin-walled beams", Computers and Structures, 89, 1069–1076, (2011).

[3] Kato J., Ramm E., "Optimization of fiber geometry for fiber reinforced composites considering damage", Finite Elements in Analysis and Design, 46, 401– 415, (2010).

[4] Ashwini Arjun, Dr. Prashant Pawar, "Eigenvalue Analysis of Composite Box Beam", International Journal of Latest Trends in Engineering and Technology (IJLTET), Vol. 5, 1-5 (2015).

[5] Alaattin Aktas, "Determination of Deflection function of Composite Cantilever Beam using theory of Anisotropic Elasticity", Mathematical and Computational Applications, Vol. 6, 67-74 (2001).

[6] Alan Andrew, "Damage Detection on Composite Beam: FEA & Experiment", International Journal of Engineering Research & Technology (IJERT), Vol. 4, 28-39 (2015).

[7] Husain Mehdi, "Modal Analysis of Composite Beam Reinforced by Aluminium-Synthetic Fibers with and without Multiple Cracks Using ANSYS", International Journal of Mechanical Engineering (IJME), Volume 4, 70-80 (2014).

[8] Syed Ayesha Yasmeen, "Modal Analysis of Fibre Reinforced Composite Beams with a Transverse Crack Using ANSYS", International Journal of Modern Engineering Research, Vol. 4, 7-14(2014).

[9] Elghazaly, Abou Elmaaty Amin, "Structural Analysis of Composite Laminated Box-Beams under Various Types of Loading", International

Journal of Engineering Research & Technology (IJERT), Vol. 3, 1127-1136 (2014).

[10] Pawar, "Validation of the thin-walled composite box beams using FEM", IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE), Volume 1, 45-49 (2012).

[11] Kim, "Nonlinear Structural Analysis of High-Aspect-Ratio Structures using Large Deflection Beam Theory", KSAS International Journal, Vol. 9, 41-47 (2008).

[12] Yousif, "Experimental & Theoretical Analysis of Composite (Polyester & Silicon-Carbide) Cantilever Beam", Al-Khwarizmi Engineering Journal, Vol. 8, 12-13 (2012).

[13] Kursun, Cetin, "Elastic Stress Analysis of Composite Cantilever Beam Loaded Uniformly, International Journal of Mechanical", Aerospace, Industrial, Mechatronics and Manufacturing Engineering Vol. 8, 275-277, (2014).

[14] J. CHUNG, H. H. YOO, "Dynamic Analysis of a Rotating Cantilever Beam by using the Finite Element Method", Journal of Sound and Vibration, 147-164 (2002).

[15] M. H. Yao, "Nonlinear vibrations of blade with varying rotating speed", Nonlinear Dynamics, Volume 68, Issue 4, 487 -504, (2012).

[16] M. Ohtsuka, "Untwist of Rotating Blades", Journal of Engineering for Power, Volume 97, Issue 2, 180-187 (2010).

[17] S.A. Sina n, H. Haddadpour, "Axial–torsional vibrations of rotating pretwisted thin walled composite beams", International Journal of Mechanical Sciences, Volume 80, 93-101 (2014).

[18] B. P. Deepak, Ranjan Ganguli, "Dynamics of rotating composite beams: A comparative study between CNT reinforced polymer composite beams and laminated composite beams using spectral finite elements", International Journal of Mechanical Sciences 64, 110–126 (2012).

[19] K.B. Subrahmanyam , K.R.V. Kaza, "Finite difference analysis of torsional vibrations of pre twisted, rotating, cantilever beams with effects of warping", Journal of Sound and Vibration, Volume 99, Issue 2, 213-224 (1985).

[20] Thuc Phuong Vo, Jaehong Lee, "Free vibration of axially loaded thin-walled composite box beams", Composite Structures 90, 233–241 (2009).

[21] O.G. McGee, "Influence of warping-pretwist coupling on the torsional vibration of centrifugally-stressed cantilevers with thin-walled open-profile", Computers & Structures, Volume 42, Issue 2, 175-195 (1992).

[22] Hong Hee Yooa, Jung Eun Chob, Jintai Chung, "Modal analysis and shape optimization of rotating cantilever beams", Journal of Sound and Vibration 290, 223–241 (2006).

[23] A. Rosen, "Theoretical and Experimental Investigation of the Nonlinear Torsion and Extension of Initially Twisted Bars", Journal of Applied Mechanics, Volume 50, Issue 2, 321-326 (1983).

[24] C. Martín Saravia, "Free vibration and dynamic stability of rotating thin-walled composite beams", European Journal of Mechanics A/Solids 30, 432-441 (2011).

[25] I. V. Tate, Sajal Roy, "Delamination Detection of Composite Cantilever Beam Coupled With Piezoelectric Transducer Using Natural Frequency Deviation", 12th Global Congress on Manufacturing and Management, 97, 1293–1304, (2014).

[26] Onur Sayman, "Effect of the Root Crack on Natural Frequencies of Sandwich Composite Beams", Pamukkale Universitesi Muhendislik Bilimleri Dergisi, Cilt 19, 298-302.

[27] Jeslin Thalapil, "Detection of longitudinal crack in long and short using changes in natural frequency", International Journal of Mechanical Sciences, 83, 38–47, (2014).

[28] Celalettin Karaagac, Free vibration and lateral buckling of a cantilever slender beam with an edge crack: Experimental and numerical studies", Journal of Sound and Vibration, 326, 235–250, (2009).

[29] Yang LIU, "Free Vibration of Delaminated Beams with an Edge Crack", International Conference on Materials for Advanced Technologies, 75, 78 – 82, (2014).

[30] Librescu L., Qin Z., Ambur D. R., "Implications of warping restraint on statics and dynamics of elastically tailored thin walled composite beams", International Journal of Mechanical Science, 45(8), 1 247–1 267, (2003).

[31] Chung J., Yoo H., "Dynamic analysis of a rotating cantilever beam using the finite element method", Journal of Sound and Vibration, 249, 147-164, (2002).

[32] Yongsheng R., Yang S., "Modeling and Free Vibration Behavior of Rotating Composite Thin walled Closed section Beams with SMA Fibers", Chinese Journal of Mechanical engineering, 455, 37-58, (2003).

[33] Zak A., Krawczuk M., "Assessment of flexural beam behavior theories used for dynamics and wave propagation problems", Journal of Sound and Vibration, 331, 5715-5731, (2012).

[34] Amit Banerjee, G Pohit, "Crack Investigation of Rotating Cantilever Beam by Fractal Dimension Analysis", 2nd International Conference on Innovations in Automation and Mechatronics Engineering (ICIAME), 14, 188 – 195 (2014).

[35] M. Tahani, A. Nosier, J. Rezaeepazhand, S.M. Zebarjad, "Analytical Stress Analysis of Rotating Composite Beams Due to Material Discontinuities", Fourth Asian–Australasian Conference on Composite Materials (ACCM 4), 223–228 (2004).

[36] Chris Warren, Chris Niezrecki, "Optical Non-contacting Vibration Measurement of Rotating Turbine Blades II", Proceedings of the IMAC-XXVIII, Society for Experimental Mechanics Inc. (2010).

Appendix

Publication on Current Work:

1) Avinash K. Parkhe, Ranjit B. Kapurkar, Dr. Prashant M. Pawar, "Analytical and Numerical Analysis of Ovel Shaped Composite Beam", Paper in International COMSOL Conference, Oct-2015.

2) A. K. Parkhe, R. B. Kapurkar, Dr. P. M. Pawar, "Analytical and Numerical Analysis of Ovel Shaped Composite Beam", Poster in International COMSOL Conference, Oct-2015.

3) Avinash K. Parkhe, Pradip D. Haridas, R. B. Kapurkar, Dr. Prashant M. Pawar, "Experimental Study on Natural Frequency of Composite Box Beam for Multiple Cracks", International Journal of Research in Aeronautical and Mechanical Engineering (IJRAME), Vol-3, Issue-12, pp. 20-25, Dec-2015.

Static & Dynamic Research of Composite Blade using Condition Monitoring Method

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Abstract: ***The use of composite materials has been increased in different industries like civil, mechanical, aerospace engineering due to their better properties. The rotating blade plays an important role in engineering structures such as turbine blades, airplane propellers, and helicopter blades. This deals with static analysis of composite blade to estimate the material uncertainty by measuring the deflection. The composite blade is fixed like a cantilever beam. To measure this deflection the Hall Effect Sensor is developed which is non contact device works on magnetic field. If magnet is come in front of sensor it creates magnetic field between them and that change in voltage or field is calibrated in terms of deflection of blade. The same process is carried for all the blades to check their uncertainty present in it. Also, it is deals with the dynamic analysis of blade to check their behavior in the axis under rotating condition for different RPM. The acceleration is considered as performance parameter to check the behavior of blade. Also, the setup is developed for accelerations measurement GY-521 Accelerometer. The accelerometer has kept at free end of blade and accelerations are taken in three directions for each rpm and it is represented in a graphical form. The analysis is carryout for both damaged and undamaged blade. The both studies are carried out using condition monitoring approach to observe their behavior of blade in static & dynamic condition before used in any application.***

Keywords: Uncertainty, Hall Effect, Static, Dynamic, GY-521, Arduino, Accelerations.

I. INTRODUCTION

This deals with static analysis of composite blade to estimate the material uncertainty. The deflection is measured to check the uncertainties present in material. The composite blade is fixed like a cantilever beam. To this deflection the Hall Effect Sensor is developed which is non contact device works on magnetic field. If magnet is come in front of sensor it create magnetic field between them and that change in voltage or field is calibrated in terms of deflection of blade. The same process is carried for all the blades to check their uncertainty present in it. Also, it is deals with the dynamic analysis of blade to check their behavior in the axis under rotating condition for different RPM. The acceleration is considered as performance parameter to check the behavior of blade. Also, for accelerations measurement, the setup is developed using GY-521 Accelerometer and Arduino. The accelerometer has kept at free end of blade and rotates it for different rpm. During rotating condition accelerations are taken in three directions for each and results are represented in a graphical. This study is carried out for both damaged and undamaged using the same parameter. [1, 2, 3]

The researches have been conducted on composite blades. Ronge et al. presented experimental setup for damage identification of rotating blade for both damaged and undamaged using health monitoring approach. Kachareet. al represented the measurement of acceleration using dynamic setup. Kachareet. al presented theory of health monitoring of blade and parameters related to same. The proposed approach is further extended to study large deflection behavior of an initially curved cantilever beam subjected to distributed and combined load. These results are successfully validated with existing results for straight beams and some new results are furnished for initially curved cantilever beams. Mohammad Dado et al. studied the very large deflection behavior of prismatic and non-prismatic cantilever beams subjected to various types of loadings. The formulation is based on representing the angle of rotation of the beam by a polynomial on the position variable along the deflected beam axis. Beléndez, T. et al. presented the classical problem of deflection of a cantilever beam of linear elastic material, under the action of a uniformly distributed load along its length (its own weight) and an external vertical concentrated load at the free end, is experimentally and numerically analyzed. We present the differential equation governing the behavior of this system and show that this equation, although straightforward in appearance, is in fact rather difficult to solve due to the presence of a nonlinear term.

The both static and dynamic studies are carried out using condition monitoring approach to observe the behavior of blade before their use in any application.

II. INTRODUCTION COMPOSITE BLADE

The composite blade of uniform cross-section having dimension 800x60x22 mm. This is an eight layer sandwich composite blade.

Revised Version Manuscript Received on 10 September, 2019.

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Figure 1Composite blade

Material Properties:

Table1 Material Properties of Composite blade

Young's Modulus	Poisson's Ratio	Mod. of Rigidity	Density
135 Gpa (Ex Dir.) 10 Gpa (Ey Dir.) 10 Gpa (Ez Dir.)	0.26	5 Gpa	1600 kg/m3

III. STATIC ANALYSIS OF COMPOSITE BLADE

3.1 Hall Effect Sensor & Arduion (Uno):

The Hall Effect is an ideal sensing technology. The Hall element is constructed from a thin sheet of conductive material with output connections perpendicular to the direction of current flow. When subjected to a magnetic field, it responds with an output voltage proportional to the magnetic field strength. The voltage output is very small (μV) and requires additional electronics to achieve useful voltage levels. When the Hall element is combined with the associated electronics, it forms a Hall Effect sensor. The reasons for using a particular technology or sensor vary according to the application. Cost, performance and availability are always considerations.

Arduion is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (referred to as microcontroller) and a piece of software that runs on your computer, used to write and upload computer code to the physical board. We use the Arduino Uno for our study which is one of the more popular boards in the Arduino family and the configuration of it as shown in figure below.

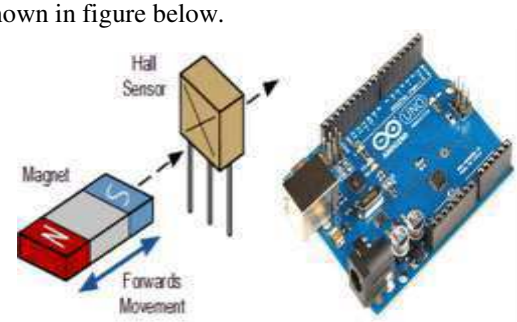


Figure 2 Hall Effect Sensor. Figure 3 Arduino Uno

3.2. Experimental Analysis:

Theexperimentation has carried on composite blade for by varying load at free end to find the deflection using Hall Effect sensor. The designed Hall Effect sensor will generate maximum voltage up to 220 volt, if distance between sensor and magnet is up to 6 mm. Initially, we put 1 to 2 mm distance between sensor and magnet then it shows some voltage will assumed as zero. When 10 N load is applied at free end of the bladethe voltage difference is generated between initial and final reading. The change in voltage difference is calibrated in terms of deflection of blade. The same process is carried out for other loads (20N to 80N) and its voltage differences are calculated using in graphical form which are generated during experimentation.

The experimental setup for the above proposed work and blade in loading and unloading conditionis shown by following figures.



Figure4Experimental setups using Hall Effect Sensor



Figure 5Composite blade in unloading and loading condition

During experimentation it has analyzed that for 10 N load 16 v voltage generated and by using this voltage we calculate the deflection of bladefor this particular load. The same process has carried on four blade. The sample calculations of first bladefor 10 N and 20 N loads are given below.

1) **Sample calculation for 10 N:**

$$\frac{6\ mm}{220\ V} = \frac{\delta}{16\ V}$$

Therefore, $\delta = 0.43$ mm

2) **Sample calculation for 20 N:**

$$\frac{6\ mm}{220\ V} \quad \frac{\delta}{25\ V}$$

Therefore, $\delta = 0.68$ mm

The voltage difference in initial and final reading for different loads is shown by following graphs. The following graphs are generated during the experimentation of first blade. The same voltage differences are calculated for remaining three blades by generating the same graphs to find its deflection for different loads.

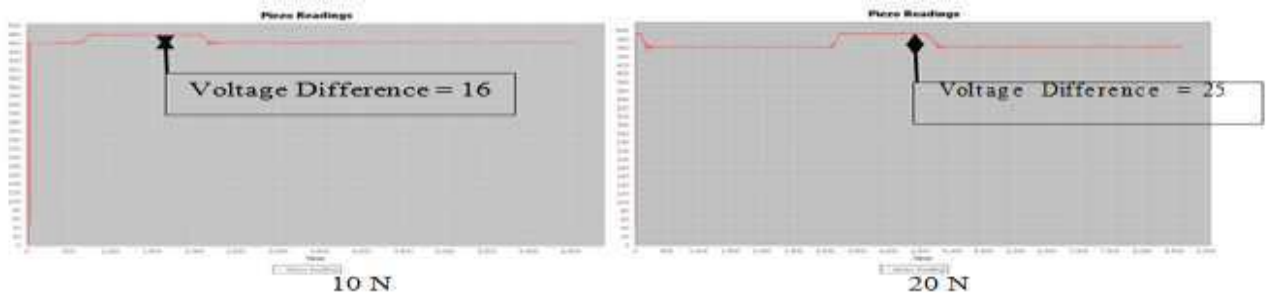


Figure 6Voltage difference in initial and final reading

Table 2 Deflection of composite blade

Sr. No.	Load (N)	Experimental Deflection (mm) Blade 1	Blade 2	Blade 3	Blade 4
1.	10	0.43	0.40	0.43	0.38
2.	20	0.68	0.68	0.62	0.73
3.	30	0.95	1.00	0.95	0.98
4.	40	1.36	1.30	1.39	1.36
5.	50	1.63	1.66	1.69	1.58
6.	60	1.77	1.77	1.71	1.69
7.	70	2.18	2.20	2.15	2.23
8.	80	2.72	2.78	2.78	2.67

Above table represents voltage difference of four composite blade along with its free end deflection for different loads.The experimental results for deflection of four blades for different loads are also shown by following graph.

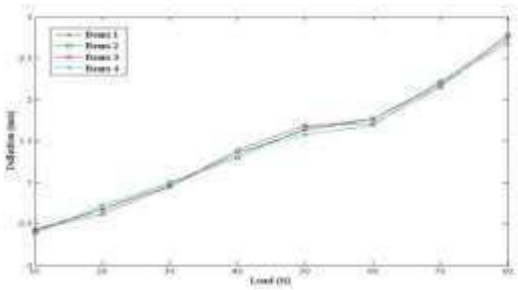


Figure 7 Load Vs Deflection

IV. DYNAMIC ANALYSIS OF COMPOSITE BLADE & RESULTS

4.1 EXPERIMENTAL SETUP FOR ACCELERATION MEASUREMENT:

The experimental setup for acceleration measurement has shown below. The accelerometer is mounted at free end of blade with arduino connection shown in figure below.



Figure 8 Experimental setup using GY-521 Accelerometer

The blade is mounted on rotating disk and rotating it for different rpm and using that proposed setup. Here we required to find the accelerations of the rotating beam in terms of g value because the direct reading of sensor is not considered as accelerations, we want to make some conversions or calculations to obtain necessary results only. The values obtained from the GY-521 accelerometer or raw values are used to find the ax, ay, az in terms of g value.. The scaling factor depends on the acceleration limit. Table 1 shows the scaling factors for acceleration limit as per standards available.

Table 3Accelerometer Scaling factors

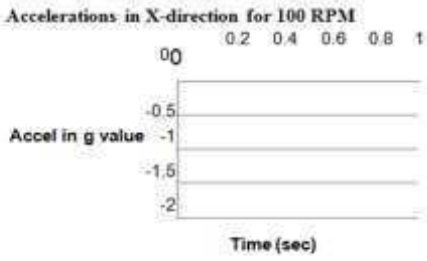
Acceleration Limit	Sensitivity or Scaling factor
2g	16384
3g	8192
4g	4096
5g	2048

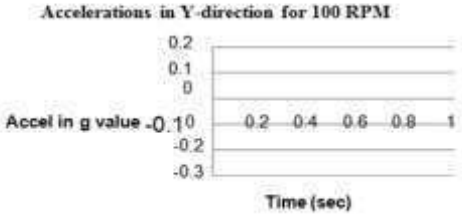
Converting the raw data:

$$\text{Required value V (ax , ay , az)} = \frac{\text{raw value}}{\text{Sensivity V Scaling factor}} \quad (\text{i. g value})$$

4.2 ACCELERATIONS IN UNDAMAGED ROTATING COMPOSITE BLADE FOR DIFFERENT RPM:

In the first phase the study is carried out for undamaged blade by measuring the acceleration in the direction using the proposed setup. During the rotating condition the movement of blade is taking place in three directions and their results are represented in graphical form which is shown by following figures.





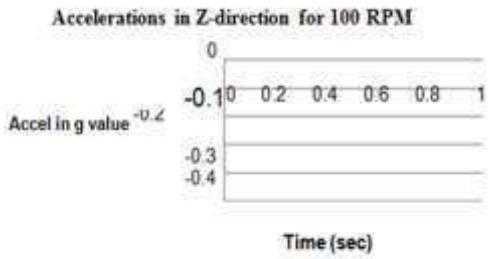


Figure 9Accelerations in undamaged blade (100 rpm)

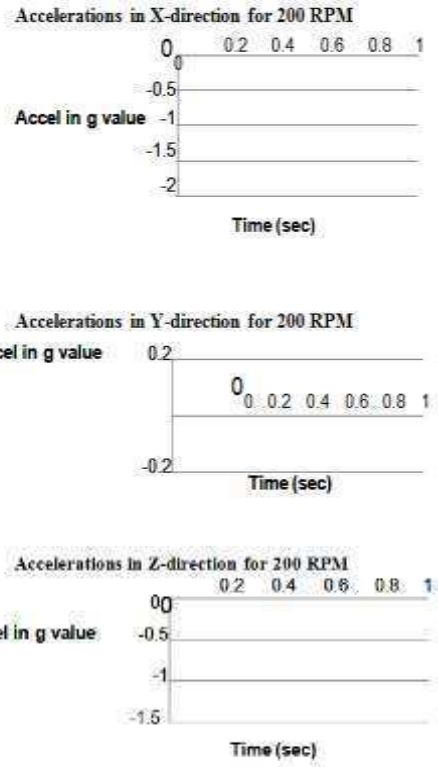


Figure 10 Accelerations in undamaged blade(200 rpm)

Figure 9 and 10 shows the accelerations (in g value) in a rotating composite box blade for different rpm. The X-direction represents axial direction, Y direction represents the horizontal rotating direction of blade and Z represents the vertical movement of the blade in rotating condition.

4.3 ACCELERATIONS IN DAMAGED ROTATING COMPOSITE BLADE FOR DIFFERENT RPM:

In the 2ndphase similar study is carried out for damaged blade using same process and setup and their results are again represented in following graphical form for different rpm.

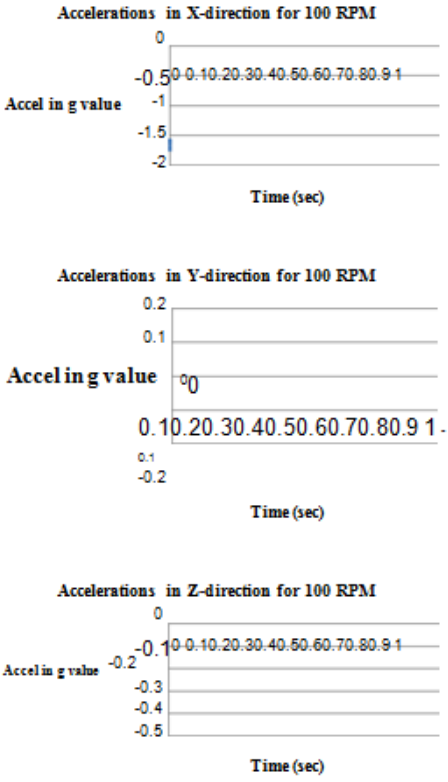


Figure 11Accelerations in damaged blade (100 rpm)

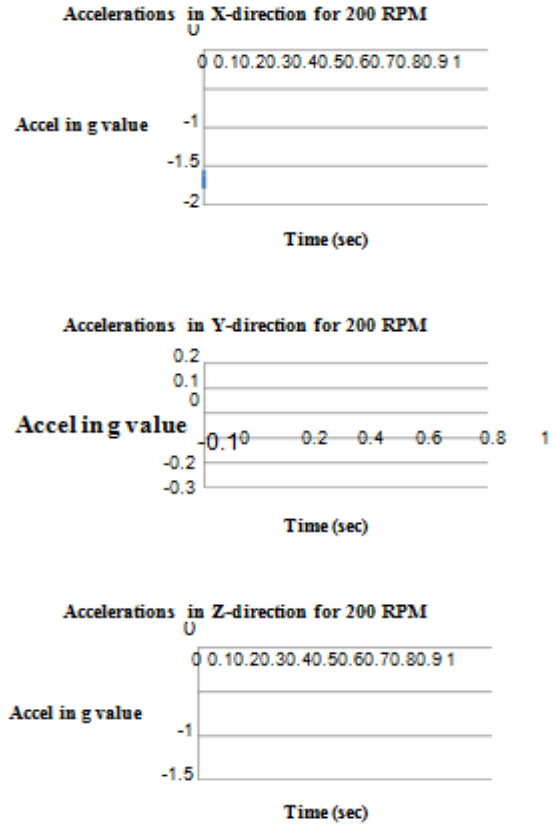


Figure 12 Accelerations in damaged blade (200 rpm)

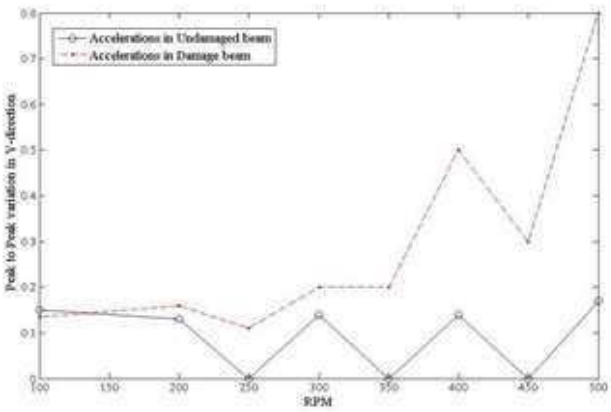


Figure 13 RPM vs accelerations in Y-direction of blade

V. CONCLUSION

During the manufacturing of composite material or blades the uncertainties has formed due to some defects or errors manufacturing process and it has studied by the different parameters like deflection, stress, strain, natural frequency etc. The experimentation has carried on composite blade for deflection measurement and this is of for all four blades by the same process and it is carried out to analyze the uncertainty present in material or blade. Also Static and Dynamic analysis was carried out on blade for acceleration measurement. From the above study on composite blade following conclusions are drawn:

The use of dial gauge indicator for deflection measurement will create problems during measurement due its contact with composite blade.

To avoid this situation non contact device is designed and developed for deflection measurement named as Hall Effect Sensor.

As deflection results of all four blades are compared with each other then there is no more difference between them.All the results are near to each other to their respective load is also shown in graphical form.

The acceleration results for damaged and undamaged blade are compared to check the behavior in rotating condition. Using the above graphical results it is observed that the accelerations are increased for damaged blade as their stiffness are get loosed and due to structure of blade get damaged. From the above results and graph the maximum deformation is taking place in Y direction for the rotating blade.

REFERENCES

1. RongeBabruvahan, PrashantPawar, and AvinashParkhe,"Experimental analysis of composite rotor blade models for damage identification." In Advances in Science and Engineering Technology International Conferences (ASET), 2018, pp. 1-6.
2. P. S. Kachare, Avinash K. Parkhe, A. A. Utpat, “Free Vibration Analysis of Rotating Composite Box Beam using GY-521 Accelerometer”, International Journal of Scientific and Research Publications, Volume 9, Issue 2, February 2019, ISSN 2250-3153.
3. P. S. Kachare, A. K. Parkhe, A. A. Utpat, S. Y. Salunkhe, “Health Monitoring of Static Composite Beam for Material Uncertainty and its Numerical Validation”, International Journal of New Technology and Research (IJNTR) ISSN:2454-4116, Volume-5, Issue-3, March 2019 Pages 79-83.
4. SushantaGhuku, KashiNathSaha.: A theoretical and experimental study on geometric nonlinearity of initially curved cantilever beams. In: Engineering Science and Technology, an International Journal, (2015)
5. Mohammad Dado.: A new technique for large deflection analysis of non-prismatic cantilever beams. In: Mechanics Research Communications 32, 692–703, (2005)
6. TarsicioBelendez, CristianNeipp.: Large and small deflections of a cantilever beam. In: European Journal of Physics, Volume 23, (2002)
7. M. Sitar.: Large deflections of nonlinearly elastic functionallygraded composite beams. Archives of Civil and Mechanical Engineering 14, 700-709, (2014)
8. Belendez, T.: Numerical and Experimental Analysis of a Cantilever Beam: A Laboratory Project to Introduce Geometric Nonlinearity in Mechanics of Materials. In: International Journal of Engineering Education, Volume 19, Issue 6, 885-892, (2003).

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(Approved by A.I.C.T.E., New Delhi and affiliated to PAH Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Department of Mechanical Engineering

Industrial Visit Record

Academic Year 2019-2020

Sr. No.	Date from	Date To	Class	Company Name	For Subject	No. of Students	No. of Faculty
1.	30/09/2019	01/10/2019	BE	Shree Saigan Indusatries, Aurangabad	AE	95	06
2.	30/09/2019	01/10/2019	BE	Saptagiri industries, Aurangabad	AE	95	06
3.	30/09/2019	01/10/2019	BE	Core Tech Auangabad Pvt. Ltd, Aurangabad	AE	95	06
4.	30/09/2019	01/10/2019	BE	Empire Mall(Prozone) Pvt. Ltd, Aurangabad	RAC	95	06
5.	27/09/2019	28/09/2019	TE	Paithan Hydro Power Station, Paithan. Aurangabad	FMFP	130	09
6.	27/09/2019	28/09/2019	TE	Indo German Tool Room, Aurangabad	FMFP	130	09
7.	19/09/2019	20/09/2019	S.Y.B. TECH.	Kedar Foundry Pvt. Ltd., Palus MIDC, Palus	MP	131	08
8.	19/09/2019	20/09/2019	S.Y.B. TECH.	Sadamate Forging Pvt. Ltd., Palus MIDC, Palus	MP	131	08
9.	19/09/2019	20/09/2019	S.Y.B. TECH.	Rocket Engineering Ltd., Kolhapur	ICE	131	08
10.	04/03/2020	05/03/2020	S.Y.B. TECH.	S.G. Gears Tembhurni	MTP	140	08
11.	04/03/2020	05/03/2020	S.Y.B. TECH.	Samrudhra Maritime Institute Lonavala	FM	140	08
12.	04/03/2020	05/03/2020	S.Y.B. TECH.	Atomic Power Station Tarapur	PP & EE	140	08

HEAD,
Dept. of Mechanical Engg
C.O.E., Pandharpur.

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To,

Date- 20/12/2019

The Principal,

SVERI's College of Engineering,

Pandharpur.

Subject- Report about Industrial Visit B.E. (Mech-A & B).

Respected sir,

As per the curriculum laid by Solapur University, Solapur for B.E. Mechanical Engineering Part-I, Refrigeration & Air Conditioning and Automobile Engineering subject include industrial visit. In this regard 95 students along with 06 faculty members visited following industries on 30/09/2019 & 01/10/2019-

1. Shree Saigan Indusatries, Aurangabad
2. Saptagiri industries, Aurangabad
3. Core Tech Aurangabad Pvt. Ltd, Aurangabad
4. Empire Mall(Prozone) Pvt. Ltd, Aurangabad

From this industrial visit students got practical knowledge about Central Air Conditioning unit & Production of Automobile parts and they are satisfied with the visit.

This is for your kind information & needful action.

(Prof. S. M. Kale)
CC- BE (A)

(Prof. D. T. Kashid)
CC- BE (B)

Forwarded for approval.
SAS
05/01/2020

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 26/09/2019

We undersigned students of B.E. Mech. (A) div. are hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Aurangabad on 30th September and 1st October 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 26/09/2019 in presence of Prof. D. T. Kashid, Prof. S. M. Kale, Prof. S. B. Bhosale, Prof. A. A. Mote & Prof. S. M. Khomane.

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
BA01	/ Namde Pooja Ankush		BA40	Vhanmane Vikram Dadaso	
BA02	/ Sarvagod Manali Vikrant		BA41	Warkhedkar Karan Prasanna	
BA03	/Deshmukh Jyoti Balasaheb		BA42	/Deshmukh Aishwarya	
BA04	/Kale Pallavi Rajkumar		BA43	/ Kame Mansi Moreshwar — A —	
BA05	/Lamgunde Pooja Somnath		BA44	/ Makar Supriya Chagan	
BA06	/Abhangrao Komal Balbhim		BA45	/Kolekar Supriya Ravindra	
BA07	Bhagwat Rushikesh Manoj		BA46	/Patil Shruti Anil	
BA08	Bhosale Onkar Shashikant		BA47	Bhanvase Amar Maruti	
BA09	Deshmukh Shrinath Jayavant	— A —	BA48	Chavan Aniket Balasaheb	
BA10	Devkar Samadhan Tanaji		BA49	Chavan Pravin Vikram	
BA11	Devmare Avinash Arjun	— A —	BA50	Chavan Sumit Sanjay	
BA12	Dune Kiran Mahipati	— A —	BA51	Chidrewar Onkar Pramod — A —	
BA13	Gaikwad Siddheshwar Subhash		BA52	Dhat Sakharam Ekanath	
BA14	Gaikwad Suraj Subhash		BA53	Dixit Shubham Ashok	
BA15	Ghodake Mahesh Bharat		BA54	Gade Omkar Govind	
BA16	Ghongade Vishal Bapurao		BA55	Gaikwad Pruthvijit Vasudev	
BA17	Godase Pavan Vilas		BA56	Gaikwad Sagar Navnath	
BA18	Gosavi Sachin Ramchandra		BA57	Ghule Mahesh Bandu — A —	
BA19	Kale Shubham Shankar — A —		BA58	Hake Akshay Arun	
BA20	Kate Pankaj Lalachand		BA59	Ingle Sachin Suresh — A —	
BA21	Kawale Chaitanya Mukund	— A —	BA60	Jadhav Arohan Anandrao	
BA22	Khadtare Rahul Suresh	— A —	BA61	Katale Ganesh Karan — A —	
BA23	Masal Shriram Chandrakant	— A —	BA62	Kulkarni Kedar Mahesh	
BA24	Patil Onkar Dadaso		BA63	Lohar Aakash Narayan	
BA25	Patil Shivprasad Namadeo		BA64	Naiknaware Mayur Baburao	
BA26	Rakate Akash Bharat		BA65	Pachakwade Laxman Popat — A —	
BA27	Ronge Nagesh Sudhakar		BA66	Pardeshi Amit Bandu	
BA28	Shaikh Shikalgar Mujammil Ishak	— A —	BA67	Patil Pushkar Mahesh	
BA29	Shalu Vishal Sudhakar	— A —	BA68	Phalake Suhas Shrimant	
BA30	Sid Ajinkya Sarjerao		BA69	Pore Onkar Gulabrao	
BA31	Torane Sachin Waman	— A —	BA70	Ranadive Savata Sadhu	
BA32	Torane Sunil Mohan	— A —	BA71	Sakhare Rohit Pandurang	
BA33	Wadgave Indrajit Somnath	I.S.wadgave	BA72	Sayyad Sameer Mansub	
BA34	Waghmare Vishal Balasaheb		BA73	Shete Shivam	
BA35	Waghmode Onkar Suryakant	— A —	BA74	Sonwalkar Ashutosh Hanumant	
BA36	Kadam Vishal Janarath		BA75	Swami Pranav Vivekanand	
BA37	Landage Balaji Vitthal	— A —	BA76	Tate Sudarshan Sushenrao	
BA38	Mahapure Suraj Bapu	— A —	BA77	Wagh Govind Rajaram	
BA39	Popale Ganesh Navnath	Ganesh	BA78	/Pujari Aruna	

(Prof. S. M. Kale)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 26/09/2019

We undersigned students of B.E. Mech. (B) div. are hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Aurangabad on 30th September and 1st October 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 26/09/2019 in presence of Prof. D. T. Kashid, Prof. S. M. Kale, Prof. S. B. Bhosale, Prof. A. A. Mote & Prof. S. M. Khomane.

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
BB01	Vastre Ganesh Shankar		BB36	Ghodake Swapnil Prakash	
BB02	Bhosale Hemant Dilip		BB37	Gunjal Ravindra Vilas	
BB03	Debojeet Bhattacharjee	A	BB38	Jadhav Ajit Shankar	P
BB04	Deshpande Abhiram Sunil		BB39	Babar Kiran Vasudev	A
BB05	Deshpande Mihir Milind		BB40	Keskar Krushnadev Arjun	
BB06	Ghodake Dattatraya Lahu		BB41	Khaladkar Vyankatesh Yuvraj	
BB07	Waydande Vivek Vijay		BB42	Kolekar Shubham Nirgun	A
BB08	Ippanpalli Pranav Hiralal	A	BB44	Kshirsagar Sushant	
BB09	Jadhav Shubham Jayshankar		BB47	Mali Mayur Shivaling	A
BB10	Jadhav Vijay Prakash		BB48	Atkale Shubham Ramchandra	
BB11	Karande Akshay Ravaso		BB49	Mote Rama Appa	
BB12	Khade Sagar Bhimashankar		BB50	Netake Pratap Nagnath	
BB13	Khot Sagar Balu	A	BB51	Netake Suraj Chandrakant	
BB14	Kotyal Shridhar Sidram		BB52	Panchal Nagesh Balaji	
BB15	Mhetre Gurudev Nagesh		BB53	Pansare Kamlesh Rajendra	
BB16	Pandit Sachin Rajendra		BB54	Patil Vikas Dasharath	
BB17	Shaikh Amir Makbul	A	BB55	Pore Rohan Haridas	A
BB18	Tamboli Sultan Motilal		BB56	Sachin Hanmant Waghmare	
BB19	Vansale Prashant Bharat		BB57	Sawant Bhushan P.	
BB20	Sonage Ravikiran Siddharam		BB58	Shinde Sudarshan Balasaheb	
BB21	Aiwale Prathamesh Babu		BB59	Jadhav Rishabh Dnyaneshwar	
BB22	Gosavi Vaibhav Digambar		BB60	Kadlaskar Sourabh Sanjay	A
BB23	Raut Charansinha Umeshchandra	P	BB61	Ghodake Akshay Narayan	A
BB24	Shende Suraj Kundalik	A	BB62	Gaikwad Viswas Savata	A
BB25	Tele Nitin Shankar				
BB26	Vyavahare Yogesh Maruti				
BB27	Rathod Sumit				
BB28	Chavan Adarsh Valu				
BB29	Chavan Aniket Dnyaneshwar				
BB30	Gate Hanumant Dadasaheb				
BB31	Bhingare Vijay Arjun				
BB32	Chavan Nikhil Vijay				
BB33	Deshmukh Ruturaj Abasaheb				
BB34	Gaikwad Pritam Madhukar				
BB35	Gawade Aniket Haridas	P			

(Prof. D. T. Kashid)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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Department of Mechanical Engineering
Schedule of Industrial Visit
B. E. Mechanical
Date: 30th September and 1st October 2019

Sr. No.	Date	Activity	Time
1.	30/09/2019	Departure from Pandharpur	12.00 a.m.
		Arrival at Shirdi Temple & Breakfast	08.00 am
		Departure from Shirdi	10.00 am
		Arrival at Jijai Industries, Waluj MIDC, Aurangabad	12.00 noon
		Departure from Jijai Industries, Waluj MIDC, Aurangabad	4.00 pm
		Night Halt at Aurangabad and Dinner	08.00 pm
2.	01/10/2019	Departure towards Prozone Mall, Aurangabad	10.00am
		Visit to Prozone Mall, Aurangabad	11.00am
		Lunch break	2.00 pm
		Departure from Aurangabad	3.00 pm
		Arrival at Pandharpur	11.00 pm

(Prof. S. M. Kale)
CC- BE (A)

(Prof. D. T. Kashid)
CC- BE (B)

HOD

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref: - COEPR /MECH/2019-20 /99(A)

Date: - 23/09/2019

To,
The Manager,
Shree Saigan Industries Pvt. Ltd.
B-28, Waluj MIDC, Aurangabad

Subject: - Seeking permission to visit your reputed Industry.

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All eligible UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

As per the Final Year syllabus laid by Punyashlok Ahilyadevi Holkar, Solapur University Solapur, we need to organize an Industrial Visit. Our students are interested to visit the reputed industry, which is under your supervision. Kindly grant permission **for 8 Faculty members** along with the **120 students** to visit your place on **30th September & 1st October 2019.**

We will remain grateful to you if give chance for industrial visit.

Thanking you.
Yours faithfully,

SAS

(Dr. S. A. Sonawane)
Head, Mech. Engineering Dept.
SVERI's College of Engineering, Pandharpur

COLLEGE OF ENGINEERING PANDHARPUR

Shree Saigan Industries
B-28, M.I.D.C. Waluj,
Aurangabad.

30/9/19

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Ref: - COEPR /MECH/2019-20 /99 CBJ

Date: - 23/09/2019

To,
The Manager,
Saptgiri Industries Pvt. Ltd,
B-14, Waluj MIDC, Aurangabad

Subject: - Seeking permission to visit your reputed Industry.

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All eligible UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

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We will remain grateful to you if give chance for industrial visit.

Thanking you.
Yours faithfully,

visited on 30/09/19

SAS

(Dr. S. A. Sonawane)
Head, Mech. Engineering Dept.
SVERI's College of Engineering, Pandharpur

COLLEGE OF ENGINEERING PANDHARPUR

SAPTAGIRI INDUSTRIES Authorised Signatory

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Ref: - COEPR /MECH/2019-20 / 99 **Date: - 23/09/2019**

To,
The Manager,
Prozone Mall,
API Rd, MIDC Industrial Area,
Chilkalthana, Aurangabad, Maharashtra 431210

Subject: - Seeking permission to visit your reputed Central Air-Conditioning System at Prozone Mall.

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All eligible UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

As per the Final Year syllabus for the **Refrigeration & Air-Conditioning subject,** we need to organize an Industrial Visit. Our students are interested to visit the reputed Central Air-Conditioning System, which is under your supervision. Kindly grant permission **for 8 Faculty members** along with the **120 students** to visit your place on **30th September & 1st October 2019.**

We will remain grateful to you if give chance for industrial visit.

Thanking you.
Yours faithfully,

SAS

(Dr. S. A. Sonawane)
Head, Mech. Engineering Dept.

COLLEGE OF ENGINEERING * PANDHARPUR *

Please plan out the visit on 1st Oct - between 12:30 to 2:30 P.M.

EMPIRE MALL PVT LTD. * AURANGABAD *

Pawan Pawar

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SVERI

core tech

Mr. Digambar Kashid <dtkashid@coe.sveri.ac.in>

About Permission for industry Visit to your industry

3 messages

Mr. Digambar Kashid <dtkashid@coe.sveri.ac.in>
To: coretechaurangabad@gmail.com, jijaiindustries@gmail.com
Thu, Sep 26, 2019 at 10:50 AM

Respected Sir,
Greetings of the day!!!
As per our telephonic discussion of Prof.S. Y. Salunkhe with Mr. Arjun Gaikwad Saheb , We request you to grant the permission for visit to your Industry at Waluj MIDC, Aurangabad on 30th September 2019. Herewith I am attaching the copy permission letter.
We will be very much thankful to you & your industry for giving us opportunity to visit your plant.
So kindly revert me about the same for the confirmation.

Regards,
Mr. D. T. Kashid
Assistant Professor,
Mechanical Engg. Dept.
SVERI's COE, Pandharpur
Mob. No. 9168655335

Please do not print this email unless it is absolutely necessary.
Every 3000 sheets of paper cost us a tree. Let's save our environment.

permission letter to aURANGABAD Industry.pdf
230K

Arjun Gaikwad <jijaiindustries@gmail.com>
To: "Mr. Digambar Kashid" <dtkashid@coe.sveri.ac.in>
Cc: coretechaurangabad@gmail.com
Thu, Sep 26, 2019 at 1:06 PM

I confirm the same.

We are requesting you pl.time of visiting company in 25 student per Bach per 30 1/3 hours
Well come to my company
[Quoted text hidden]

Mr. Digambar Kashid <dtkashid@coe.sveri.ac.in>
To: Arjun Gaikwad <jijaiindustries@gmail.com>
Thu, Sep 26, 2019 at 1:08 PM

Thanks a lot sir.
[Quoted text hidden]

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
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Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref: - COEPR /MECH/2019-20 /99(A)

Date: - 26/09/2019

To,
Mr. Arjun Gaikwad,
Jijai Industries.
Plot No.- C 252/2 B/ P 23,
MIDC Waluj, Aurangabad, Maharashtra 431136

Subject: - Seeking permission to visit your reputed Industry.

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All eligible UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

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We will remain grateful to you if give chance for industrial visit.

Thanking you.
Yours faithfully,

Core Tech Aurangabad Pvt. Ltd. WALUJ

(Dr. S. A. Sonawane)
Head, Mech. Engineering Dept.
SVERI's College of Engineering, Pandharpur

PANDHARPUR

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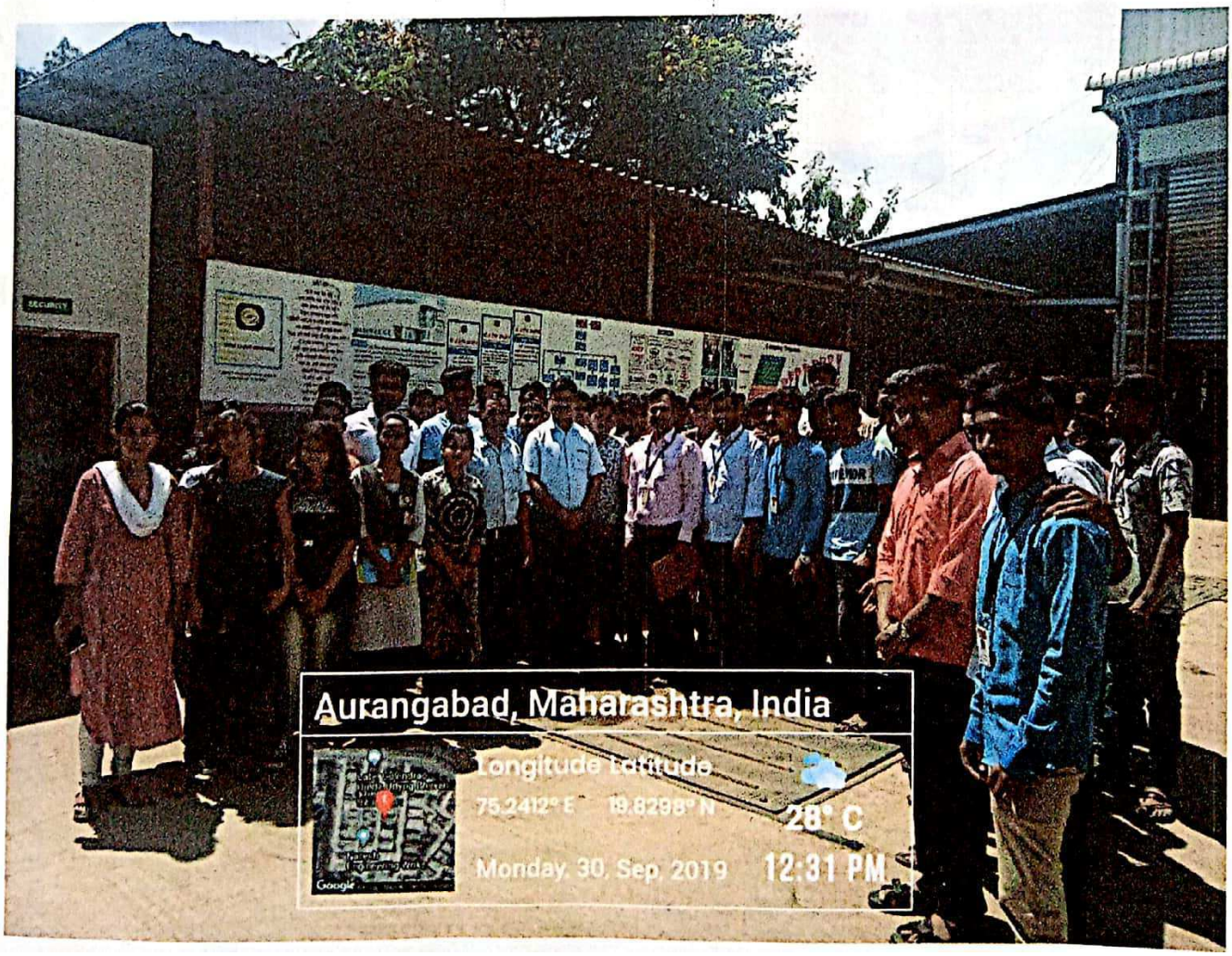
Shree Saigan Industries, Waluj





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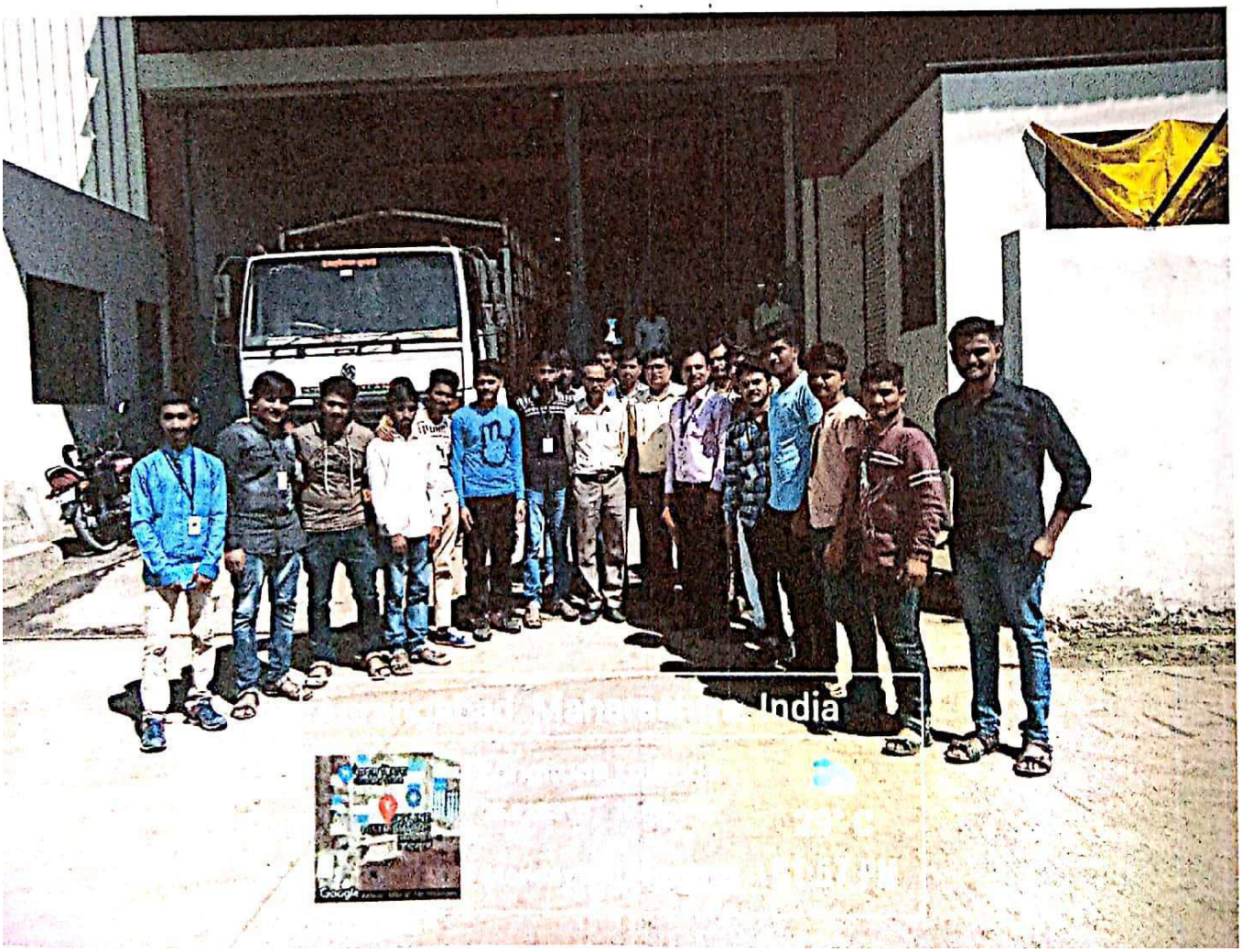
Saptgiri Industries Pvt. Ltd, Waluj





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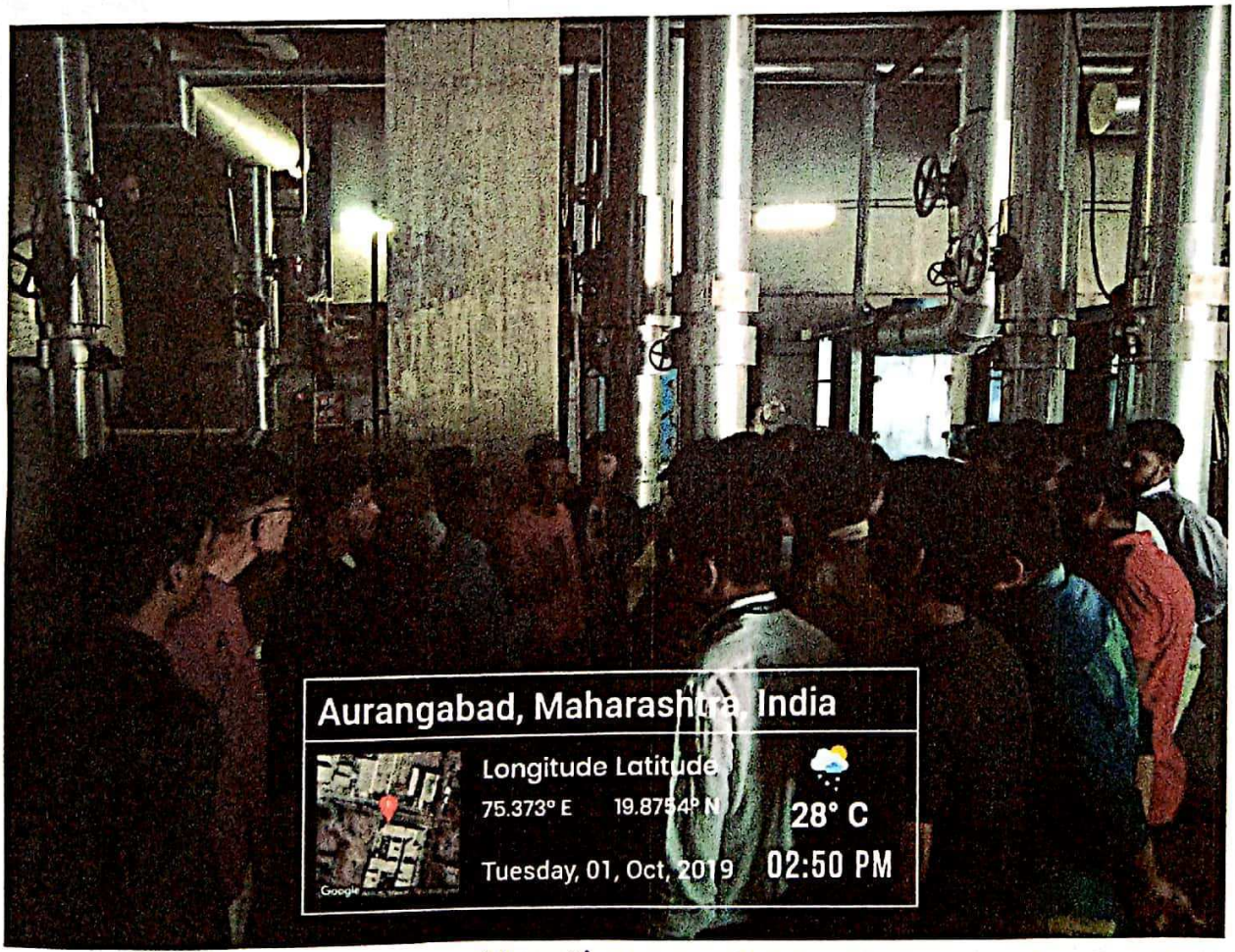
CoreTech Aurangabad Pvt. Ltd, Waluj, Aurangabad





Prozone Mall Air conditioning System, Aurangabad

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 SEM: I
CLASS: B. E. (MECH) DIV: A
ROLL CALL LIST

(53)

Industrial Visit Attendance Date- 30/09/19

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
BA01	/ Namde Pooja Ankush	P	BA42	/Deshmukh Aishwarya	P
BA02	/ Sarvagod Manali Vikrant	P	BA43	/ Kame Mansi Moreshwar	A
BA03	/Deshmukh Jyoti Balasaheb	P	BA44	/ Makar Supriya Chagan	P
BA04	/Kale Pallavi Rajkumar	A	BA45	/Kolekar Supriya Ravindra	P
BA05	/Lamgunde Pooja Somnath	P	BA46	/Patil Shruti Anil	P
BA06	/Abhangrao Komal Balbhim	P	BA47	Bhanvase Amar Maruti	P
BA07	Bhagwat Rushikesh Manoj	P	BA48	Chavan Aniket Balasaheb	P
BA08	Bhosale Onkar Shashikant	—	BA49	Chavan Pravin Vikram	P
BA09	Deshmukh Shrinath Jayavant	—	BA50	Chavan Sumit Sanjay	P
BA10	Devkar Samadhan Tanaji	P	BA51	Chidrewar Onkar Pramod	A
BA11	Devmare Avinash Arjun	—	BA52	Dhat Sakharam Ekanath	P
BA12	Dune Kiran Mahipati	—	BA53	Dixit Shubham Ashok	P
BA13	Gaikwad Siddheshwar Subhash	P	BA54	Gade Omkar Govind	P
BA14	Gaikwad Suraj Subhash	P	BA55	Gaikwad Pruthvijit Vasudev	P
BA15	Ghodake Mahesh Bharat	A	BA56	Gaikwad Sagar Navnath	P
BA16	Ghongade Vishal Bapurao	P	BA57	Ghule Mahesh Bandu	A
BA17	Godase Pavan Vilas	P	BA58	Hake Akshay Arun	P
BA18	Gosavi Sachin Ramchandra	P	BA59	Ingle Sachin Suresh	
BA19	Kale Shubham Shankar	A	BA60	Jadhav Arohan Anandrao	P
BA20	Kate Pankaj Lalachand	P	BA61	Katale Ganesh Karan	A
BA21	Kawale Chaitanya Mukund	A	BA62	Kulkarni Koda Mahesh	P
BA22	Khadtare Rahul Suresh	A	BA63	Lohar Aakash Narayan	P
BA23	Masal Shriram Chandrakant	A	BA64	Naiknaware Mayur Baburao	P
BA24	Patil Onkar Dadaso	P	BA65	Pachakwade Laxman Popat	A
BA25	Patil Shivprasad Namadeo	P	BA66	Pardeshi Amit Bandu	P
BA26	Rakate Akash Bharat	P	BA67	Patil Pushkar Mahesh	P
BA27	Ronge Nagesh Sudhakar	P	BA68	Phalake Suhas Shrimant	P
BA28	Shaikh Shikalgar Mujammil	A	BA69	Pore Onkar Gulabrao	P
BA29	Shalu Vishal Sudhakar	A	BA70	Ranadive Savata Sadhu	A
BA30	Sid Ajinkya Sarjerao	P	BA71	Sakhare Rohit Pandurang	P
BA31	Torane Sachin Waman	A	BA72	Sayyad Sameer Mansub	P
BA32	Torane Sunil Mohan	A	BA73	Shete Shivam	P
BA33	Wadgave Indrajit Somnath	P	BA74	Sonwalkar Ashutosh Hanumant	P
BA34	Waghmare Vishal Balasaheb	P	BA75	Swami Pranav Vivekanand	P
BA35	Waghmode Onkar Suryakant	A	BA76	Tate Sudarshan Sushenrao	A
BA36	Kadam Vishal Janarath	P	BA77	Wagh Govind Rajaram	P
BA37	Landage Balaji Vitthal	A	BA78	/Pujari Aruna	P
BA38	Mahapure Suraj Bapu	A	**Batch**	**Roll No.**	
BA39	Popale Ganesh Navnath	P	**BA1**	**BA01 –BA 20**	20
BA40	Vhanmane Vikram Dadaso	P	**BA2**	**BA21 –BA 41**	21
BA41	Warkhedkar Karan Prasanna	P	**BA3**	**BA42 –BA 59**	18
			BA4	**BA60 –BA 77**	18

(Prof. S. M. Kale)
Class- Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 SEM: I
CLASS: B. E. (MECH) DIV: B
Industrial Visit Attendance **Date-** 30/09/2019

(42)

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
BB01	Vastre Ganesh Shankar	P	BB36	Ghodake Swapnil Prakash	P
BB02	Bhosale Hemant Dilip	P	BB37	Gunjal Ravindra Vilas	P
BB03	Debojeet Bhattacharjee	A	BB38	Jadhav Ajit Shankar	P
BB04	Deshpande Abhiram	P	BB39	Babar Kiran Vasudev	A
BB05	Deshpande Mihir Milind	P	BB40	Keskar Krushnadev Arjun	P
BB06	Ghodake Dattatraya Lahu	P	BB41	Khaladkar Vyankatesh Yuvraj	P
BB07	Waydande Vivek Vijay	P	BB42	Kolekar Shubham Nirgun	A
BB08	Ippanpalli Pranav Hiralal	A			
BB09	Jadhav Shubham Jayshankar	P	BB44	Kshirsagar Sushant	P
BB10	Jadhav Vijay Prakash	P			
BB11	Karande Akshay Ravaso	P			
BB12	Khade Sagar Bhimashankar	P	BB47	Mali Mayur Shivaling	P
BB13	Khot Sagar Balu	A	BB48	Atkale Shubham Ramchandra	A
BB14	Kotyal Shridhar Sidram	P	BB49	Mote Rama Appa	P
BB15	Mhetre Gurudev Nagesh	P	BB50	Netake Pratap Nagnath	P
BB16	Pandit Sachin Rajendra (YD)	P	BB51	Netake Suraj Chandrakant	P
BB17	Shaikh Amir Makbul	A	BB52	Panchal Nagesh Balaji	P
BB18	Tamboli Sultan Motilal	P	BB53	Pansare Kamlesh Rajendra	P
BB19	Vansale Prashant Bharat	P	BB54	Patil Vikas Dasharath	A
BB20	Sonage Ravikiran Siddharam	P	BB55	Pore Rohan Haridas	A
BB21	Aiwale Prathamesh Babu	P	BB56	Sachin Hanmant Waghmare	P
BB22	Gosavi Vaibhav Digambar	P	BB57	Sawant Bhushan P.	A
BB23	Raut Charansinha	P	BB58	Shinde Sudarshan Balasaheb	A
BB24	Shende Suraj Kundalik	A	BB59	Jadhav Rishabh Dnyaneshwar	P
BB25	Tele Nitin Shankar	P	BB60	Kadlaskar Sourabh Sanjay	A
BB26	Vyavahare Yogesh Maruti	P	BB61	Ghodake Akshay	A
BB27	Rathod Sumit	P	BB62	Gaikwad Viswas Savata	A
BB28	Chavan Adarsh Valu	P			
BB29	Chavan Aniket Dnyaneshwar	P			
BB30	Gate Hanumant Dadasaheb	P	**Batch**	**Roll No.**	**Batch strength**
BB31	Bhingare Vijay Arjun	P	**BB1**	**BB 01 –BB 19**	19 Nos
BB32	Chavan Nikhil Vijay	A	**BB2**	**BB 20 –BB 40**	21 Nos
BB33	Deshmukh Ruturaj Abasaheb	P	**BB3**	**BB 41 –BB 62**	20 Nos
BB34	Gaikwad Pritam Madhukar	P			
BB35	Gawade Aniket Haridas	P			

(Prof. D. T. Kashid)
Class Coordinator

(Dr. S. A. Sonawane)
HOD, Mech. Engg. Dept.

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B.E. (Mechanical Engineering) Semester-I

ME414 (C): Professional Elective-V
Automobile Engineering

Teaching Scheme
Lectures– 3Hours/week, 3 Credits
Practical – 2Hour/week, 1 Credit

Examination Scheme
ESE–70 Marks
ISE –30Marks
ICA-25 Marks
OE-25 Marks

Course Introduction:

There is all round development in the field of design and manufacture of automobile. This has resulted in vast improvement in their efficiency, comfort and safety. There is consequential tremendous increase in production and use of automobiles worldwide. This has opened the job opportunities for Mechanical engineers in Automobile sector.

Course Prerequisites:

4. Knowledge of elementary mathematics,
5. Basic knowledge of various core subjects like Theory of Machines, Manufacturing Process , Design engineering, Fluid Mechanics and Electrical Engineering, Engineering materials

Course Objectives: During this course, a student is expected to

1. Study basic principles of actual automobile systems
2. Study important systems in an automobile
3. Study recent and modern trends in automobile sector
4. To make the student conversant with automobile safety, electrical system
5. To make students aware about the entrepreneurial opportunities in automobile engineering field.

Course Outcomes: At the end of this course, student will be able to

1. Demonstrate & explain various systems in an automobile
2. Describe importance and features of different elements like axle, differential, brakes, steering, suspension, wheel balancing etc.
3. Explain principle of operation, construction and applications of various sensors used in modern automobile and understand electric vehicles, hybrid electric vehicles and solar

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Group II (Minimum four experiments from following)

1. Trial on Refrigeration primer / bench
2. Trial on Air conditioning tutor
3. Trial on mini ice plant
4. Trial on Vapour Absorption system
5. Trial on Heat Pump
6. Trial on Vortex tube

Group III

1. Visit to Refrigeration plant or Central Air Conditioning plant
2.
3. Performance evaluation of any one trial of Group-II by using MATLAB/C Programming

- **Text Books:**
  1. 'Refrigeration & Air Conditioning' by C. P. Arora
  2. 'Refrigeration & Air Conditioning' by Arora &Domkundwar
  3. 'Refrigeration and Air-conditioning' by S. N. Sapali
- **Reference Books:**
  1. 'Principles of Refrigeration 'by Roy J Dossat
  2. 'Air Conditioning Applications & design' by W.P.Jones
  3. 'Refrigeration &Air Conditioning 'by Stocker

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B.E. (Mechanical Engineering) Semester-1
ME412 Refrigeration and Air Conditioning

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hours/week, 3 Credits	**ESE**– 70 Marks
Practical –	**ISE** - 30 Marks
	ICA- 25 Marks
	POE- 25 Marks

Course Introduction:
This course deals with study of various refrigeration processes and refrigeration cycles such as Air refrigeration cycle, Vapour Compression cycle, Vapour absorption cycle. It also covers properties of refrigerants and various alternative refrigerants. In second part study of psychometric processes and its analysis for producing required air conditions are dealt. Further it deals with human comfort requirements and study of air distribution systems.

Course Prerequisite:
Student should have knowledge of basic concepts of thermodynamics and laws of heat transfer along with equations to calculate heat flow rate by various modes of heat transfer.

Course Objectives: During this course, student is expected to

1. Familiarize with the terminology associated with refrigeration systems and air conditioning systems.
2. To understand basic refrigeration processes.
3. To understand basics of psychrometry and practice of applied psychrometric.
4. To acquire the skills required to design and analyse refrigeration and air conditioning components and systems.

Course Outcomes: At the end of this course, student will be able to

1. Explain Basic Refrigeration Processes
2. Analyze and Calculate Performance of Refrigeration Systems
3. Select proper Refrigerant for specific application
4. Define and Calculate Psychometric properties of air using chart and tables
5. Decide and Analyze Psychometric process for obtaining required air conditions
6. Explain Comfort chart and factors affecting human comfort.
7. Design Air distribution System

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- **Content Delivery Methods:** 1. Chalk and Board
  2. Demonstrations
  3. PPT and Videos
- **Term Work:**
  Minimum six experiments from Group A and two experiment from Group B are to be performed

- **Group A.**
  1. Study and demonstration of four wheeler chassis layout.
  2. Study and Demonstration of working of automobile clutches.
  3. Study and demonstration of synchromesh gearbox.
  4. Study and demonstration of final drive and differential.
  5. Study and demonstration of working Hydraulic braking system.
  6. Study and demonstration of steering gear boxes.
  7. Study and demonstration of suspension systems used in four-wheeler.
  8. Study and demonstration of battery and electrical starting system
  9. Study and demonstration of (a) Electric horn. (b) Electric fuel Gauge. (c) Flasher unit. (d) Wiper circuit
- **Group B.**
  1. Demonstration of wheel balancing and wheel alignment.
  2. Visit to servicing station for study of vehicle maintenance, repairs and report.
  3. A case study presentation and report covering recent trends in automobiles.

Text Books:

1. Kripal Singh - Automobile Engineering – Standard publisher.
2. Automobile Mechanics -.N. K. Giri
3. Automobile Electrical Equipment -P. S. Kohali

Reference Books:

1. K. Newton and W. Seeds, T.K. Garrett,Motor Vehicle, Elsevier publications
2. Hans Hermann Braess, Ulrich Seiffen, handbook of Automotive Engineering, SAE Publications
3. William H. Crouse. Automotive Mechanics - Tata McGraw Hill Publishing House
4. Joseph Heitner, Automotive Mechanics -C.B.S Publishers And Distributors
5. SAE Manuals and Standard
8. Narang G. B. S - Automobile Engineering - S. Chand and Company Ltd.

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Industrial Visit Report

To,

Date:- 30/10/2019

The Principal

SVERI'S COEP

Pandharpur.

Subject:- Report of Industrial Visit

Respected Sir,

As per the curriculum laid by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for TE (Mechanical Engineering Part-I), Fluid Machinery and Fluid Power subject has included industrial visit. In this regard,130 student along with 9 faculty members visited Hydro Power Station Paithan, Tal. Paithan Dist. Aurangabad, on 27th and 28th Sept. 2019. During Visit we had seen various parts of turbine, Hydro power station. From this industrial visit student got practical knowledge about actual hydro power generation and they got satisfied with the visit

This is for your kind information and needful action.

Thanking you

(Prof. V. R. Chavan)
FMFP Subject Teacher
TE (Mech) Div:- A and B

(Prof. K.S.Pukale)
FMFP Practical Teacher
TE (Mech) Div:- A

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Industrial Visit Report

To,

The Principal

SVERI'S COEP

Pandharpur

Date:- 30/10/2019

Subject:- Report of Industrial Visit

Respected Sir,

As per the curriculum laid by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for TE (Mechanical Engineering Part-I), Fluid Machinery and Fluid Power subject has included industrial visit. In this regard,130 student along with 9 faculty members visited Indo German Tool Room, Aurangabad, on 27th and 28th Sept. 2019. During Visit we had seen various measuring instruments like limit gauges- plug gauges, snap gauges and co-ordinate measuring machine. From this industrial visit student got practical knowledge about actual hydro power generation and they got satisfied with the visit

This is for your kind information and needful action.

Thanking you

(Prof. S.N.More)
MMM Subject Teacher
TE (Mech) Div:- A

(Prof. K.B. Jundale)
MMM Subject Teacher
TE (Mech) Div:- B

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Date: 22/09/2019

To

The Principal /Dean Students,

SVERI's College of Engineering,

Pandharpur.

Subject: Permission for industrial visit of T. E. (Mechanical)

Respected Sir,

As per the curriculum laid down Punyashlok Ahilyadevi Holkar Solapur University Solapur for T. E. (Mechanical) (Part-I), the subject of 'Fluid Machinery and Fluid Power' includes industrial visits. In the processing of same, we have sent letters related to Jayakwadi Hydro Power Station Paithan Dist. Aurangabad , for asking permission to visit their organizations. In response, permission has been granted between 27th to 28th Sept.2019.

In view of this, we request you to grant us the permission to arrange visit of T. E. Mechanical on 26th Sept. 2019 to 28th Sept. 2019.

Thanking you.

Yours Sincerely,

(Prof. S. N. More)
CC- TE (A)

(Prof. K. B. Jundale)
CC- TE (B)

(Prof. V. R. Chavan)
Subject Teacher- FMFP TE (A) & (B)

Enclosures:

1. Copy of syllabus
2. Permission letters from industries
3. Schedule of visit
4. List of staff accompanying the visit

Forwarded to Dean Students
23/09/19

- Granted for Ind. visit as per schedule
- Night traveling be avoided.

23/9

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FMFP

- **Content Delivery Methods:** Board, Chalk and talk

Term-Work

Compulsory:

1. A drawing sheet on standard symbols of hydraulic & pneumatic components.

List of Experiments

A) Fluid Machinery-

Minimum 3 experiments from the following

1. Trial on a Pelton wheel.
2. Trial on a Francis/ Kaplan turbine.
3. Trial on a centrifugal pump.
4. Trial on gear pump

B) Fluid Power

Minimum 3 assignments from the following

5. Study of Pressure Control Valves & circuits using pressure control valves
6. Study of flow control valves & circuits using flow control valves
7. Study of direction control valves & check valves circuits.
8. Study of hydraulic power unit &accessories.
9. Demonstration of Minimum of Three hydraulic circuits such as :Basic hydraulic, Regenerative, Speed control (Meter in, meter out & bleed off), Sequencing, Synchronization, traverse & feed, Circuit for riveting machine, automatic reciprocating, fail safe circuit, counter balance circuit, actuator locking, circuit for hydraulic press, unloading circuit, motor breaking circuit.
11. Demonstration on Pneumatic Trainer of Minimum of Three Pneumatic circuits (based on syllabus of UNIT 10above).

C) Industrial visit to one of the following

- Hydro-electric power station
- Pumping station
- Service station of Earth Moving equipment's.

Note: Students should write visit report based on the observations made during the visit.

- **Text Books**

1. "A text book of Fluid Mechanics & Hydraulic Machines", Dr.R.K. Bansal, Laxmi Publications Ltd.
2. Thermal Engineering R.K.Rajput
3. "Oil Hydraulics- Principle & Maintenance", Majumadar, Tata McGrawHill
4. "Pneumatics- Principle & Maintenance", Majumadar, Tata McGrawHill

- **Reference Books**

1. Theory of Hydraulic Machinary", V.P. Vasandani, Khanna Publishers, Delhi.
2. "Hydraulic Machines", Dr. J. Lal, Metropolitan Book Co. Pvt. Ltd., Delhi.
3. Vickers Manual on Industrial Hydraulics
4. Festo's Manual on Pneumatic Principle, applications
5. "ABC's of Hydraulic Circuits", H L Stewart, (Taraporwala Press)
6. "ABC's of Pneumatic Circuits", H L Stewart, (Taraporwala Press)
7. Hydraulics and Pneumatics'H.L.Stewart –, Industrial Press

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MMM

- **Objectives:**
  1. To acquire knowledge of principle, construction and use of various instruments used for measurement of force, torque and strain.
- **Outcomes:** After completing this unit, student will
  1. Explain the working of various force, torque and strain measuring instruments.
  2. Setup the instruments and accessories thereof for accurate measurement.
- **Unit Content:**

Force measurement- Balance, Proving Ring, Hydraulic, Pneumatic Load Cells, Torque measurement - Hydraulic, Eddy Current. Classification of strain gauges, Principle of electrical strain gauge, Gauge factor, Introduction to half bridge and full bridge network circuits.

- **Content Delivery Methods:** Board, Chalk and talk

- **TERMWORK**

A) Metrology Laboratory:

Any five of the following experiments (Experiment No. 1 is compulsory).

1. Uses of various length measuring instruments .Vernier instruments, Micrometer instruments, Dial instruments and Auxiliary instruments for carrying out measurements.
2. Calibration of Vernier caliper / Micrometer using slip gauges.
3. Use of at least one type of each class of comparator such as mechanical, optical, pneumatic, etc.
4. Measurement of angle using Bevel protractor and sine bar / sine centre. Use of Clinometer and Angle gauges.
5. Measurement of Gear tooth thickness using gear tooth vernier caliper/ plate type micrometer
6. Measurement of diameters of screw threads using screw thread micrometer and floating carriage micrometer.
7. Demonstration of advanced measuring equipment such as Co-ordinate Measuring Machine Multigauging Machines, Automatic inspection systems. (May be done through Industrial Visits / Virtual Laboratories).

B) Mechanical Measurements Laboratory

Any five out of the following experiments:

1. Temperature Measurement using thermo couples, RTD, Thermistor.
2. Testing of mechanical pressure gauge using Dead Weight pressure tester.
3. Vacuum measurement using U tube manometer & Mechanical Vacuum Gauge.
4. Angular speed measurement using mechanical tachometer, stroboscope, photo electric pickup, inductive pickup.
5. Flow measurement using Rotameter.
6. Measurement of bending strain or load using strain gauges.
7. Use of proving ring, load cells.
8. Measurement of torque.

* Industrial Visit (Recommended for introduction to modern measuring instruments / Calibration Lab)

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Vikram Chavan <vrchavan@coe.sveri.ac.i

ling Permission for visit to your Hydro Power Station

es

Chavan <vrchavan@coe.sveri.ac.in>
anhydro@gmail.com

Mon, Sep 9, 2019 at 9:22 F

ected Sir / Madam,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and search Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of gineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All four G courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The stitution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental rocess, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and ege of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

As per the Third Year syllabus for the subject, Fluid Machinery and Fluid Power, we need to organize an Industrial Visit. Our students are interested to visit the Hydro-Electric Power Station at Paithan, which is under your supervision. we are interested to visit hydro-electric power station **in between 23rd September 2019 to 30th September 2019 as per date convenient to your team.** Kindly grant permission **for 8 Faculty members** along with the **136 students** to visit your place.

We will remain grateful to you if give chance for industrial visit.

Thanking you.

Regards :-
Mr. V.R. Chavan
Assistant professor
Mechanical Engineering Department
SVERI's College of Engineering, Pandharpur
Contact :- +91-9890455735

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ikram Chavan <vrchavan@coe.sveri.ac.in>
o: paithanhydro@gmail.com

Fri, Sep 13, 2019 at 6:40 F

Respected Sir/Madam
Can you please provide your contact no. As 02431224699 is not reachable.

Thanking you.

Regards
Vikram Chavan
Asst. Prof. Mech. Engg. Dept.
SVERI's CoE, Pandharpur.
[Quoted text hidden]

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ı Chavan <vrchavan@coe.sveri.ac.in>

eference to above subject the permission for the technical visit of the students
your college, permission shall be granted subject to following procedure/conditions.
te of visit **27.09.2019 & 28.09.2019** at **12:00 hrs**. (Reporting at **12:00** hrs sharply).
u are instructed to pay fees of the amount (No. of students x Rs. 100/- plus GST @18% on total amount) i.e. Rs.
ɔer student. This fees should be paid to the following account No. of SBi branch at Jintur, Dist Parbhani .
ɔunt No. of Executive Engineer, MSPGCL, HPS, Yeldari.
:ount No.62003512845 & IFSC code SBIN 0020019 through NEFT mode.
ɔu are instructed to intimate the payment made so to the Addl. Executive Engineer, HPS, Paithan by mailing the receipt the very same day. Also write the details of institute, no. of students, etc.
ne receipt of same is to be brought during the visit.
All the students should be strictly come in uniform with I-cards.
. Students should deposit their bags/luggage/mobile at our security gate at their responsibility.& will go through ıur security checking/scrutiny.
5. Photography at Power station is strictly prohibited.
7. Faculty member/s should control the students & ensure that students should not touch to any controls & auxiliaries of Power Station as there is LIVE ELECTRIC SUPPLY.
8. The safety of all students is the only responsibility of the faculty members & they should Submit in writing on Rs. 100/- bond paper while coming to the visit.

If any of the above condition is not fulfilled before coming to visit, your permission for the visit stands cancelled.Note that only 60 students per day are permitted

[Quoted text hidden]

--
Addl. Executive Engineer,
Paithan Hydro Power Station,
02431 224699

ɪkram Chavan <vrchavan@coe.sveri.ac.in> Wed, Sep 18, 2019 at 2:57 F
o: ckvhare@coe.sveri.ac.in

[Quoted text hidden]

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VERI

Vikram Chavan <vrchavan@coe.sveri.ac.i

Regarding Industrial Visit Permission

age

Irakant Vhare <ckvhare@coe.sveri.ac.in>
:havan@coe.sveri.ac.in

Thu, Sep 19, 2019 at 2:55 F

------- Forwarded message ---------
om:**ARNAB BHATTACHARJEE** <arnabigtr@gmail.com>
ate: Thu, 19 Sep, 2019, 12:32 PM
ubject: Re: Regarding Industrial Visit Permission
o: Chandrakant Vhare <ckvhare@coe.sveri.ac.in>
Cc: JAYESH D BAGUL <smtrg@igtr-aur.org>, Awsekar Gs <awsekar.gs@igtr-aur.org>, gopal belurkar <belurkargopal@gmail.com>, GOPAL BELURKAR <cadcam@igtr-aur.org>, ANIKET DESHMUKH <abdeshmukhigtr@gmail.com>

Dear Sir,

We hereby permit for the Industrial visit on 27th and 28th September 2019 as per your request. Upto 70 students on a day visit can be arranged .

ur information, we can conduct seminar during your visit on chargeable basis (Rs. 150/ per students only which include Lunch also, nowever, Faculties will not be charged for the Seminar) which is **optional choice** only and if the students are interested,so that, your students can get aware about the actual Industrial applications of Tool and Die Technology with the help of CAD-CAM-CAE Softwares into our Tool Room and **Seminar Certification** will be given to all those who will attend the seminar and visit.

In that case only, if students are interested for Seminar and Certification, all the visiting trainees / faculties will have to fill up the form individually & attach -

- One passport size photograph
- Marks memo photocopy of any one semester of the ongoing courses of Diploma / Degree
- One photocopy of college ID
- Copy of AADHAR card
- copy of Caste certificate if applicable

Thanks and Regards,
Arnab Bhattacharjee
Engineer (Trg.)
MSME TECHNOLOGY CENTRE,
Indo German Tool Room , Aurangabad
Co[illegible]t :- 9860579828

On Wed, Sep 18, 2019 at 3:03 PM Chandrakant Vhare <ckvhare@coe.sveri.ac.in> wrote:

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All four UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

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ze an Industrial Visit. Our students are interested to visit IGTR on 27th and 28th **September.** Kindly grant ssion **for 8 Faculty members** along with the**136 students** to visit your place.

We will remain grateful to you if give chance for industrial visit.

Thanking you.

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Department of Mechanical Engineering
Schedule of Industrial Visit
T. E. Mechanical
Date: 26th Sept. 2019 to 28th Sept. 2019.

Sr. No.	Date	Activity	Time
1.	26/09/2019	Departure from Pandharpur.	12.00 a.m.
		Arrived at Shirdi Temple & Breakfast	08.00 am
		Shirdi To Shanishingnapur and lunch	04.00 pm
		Night Halt at Deogad(Nevasa) and Dinner	08.00 pm
2.	27/09/2019		
		Departure towards IGTR and Hydro Power Station Paithan. 1) TE- A Students Hydro Power Station Paithan. 2) TE- B Students IGTR Aurangabad	9.0 am
		Visit of TE- A Students Hydro Power Station Paithan.	11.00 am
		Visit of TE- B Students IGTR Aurangabad	11.00 am
		Lunch (TE- A & TE- B)	1.30 pm
		Travelling towards Aurangabad TE- A Students.	3.00 pm
		Night Halt in Aurangabad .	9.00 pm
3.	28/09/2019	Visit of TE- B Students Hydro Power Station Paithan.	11.00 am
		Visit of TE- A Students IGTR Aurangabad .	11.00 am
		Lunch (TE- A & TE- B)	1.30 pm
		Started Journey towards Pandharpur. 1) TE- B Students From Paithan. 2) TE –A Students From Aurangabad.	3.00 pm
		Reached in Pandharpur	11.00 pm

(Prof. S. N. More)
CC- TE (A)

(Prof. K. B. Jundale)
CC- TE (B)

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2018-19 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 22/09/2019

We undersigned students of TE Mech. (A) div. are hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Aurangabad on 26th to 28th September 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 22/09/2019 in presence of Prof. S N. More, Prof. K. S. Pukale, Prof. V.R. Chavan Prof. S. Y. Salunkhe, /Prof. A.S Pathan.

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
TA 01	/BhumkarManasi Dinesh		TA 39	Kale Rohan Suresh	
TA 02	/ChavanSonaliUmesh		TA 40	Kale ShubhamMalashidha	
TA 03	/GhogaleMansi Sanjay		TA 41	Kale VaibhavPandurang	
TA 04	/Attar MuskanMukthar		TA 42	KambirePankajPopat	
TA 05	/MhetreShubhadaShantanu		TA 43	KhadakePrajwal Sunil	
TA 06	/Gavali Anjali Pandurang		TA 44	KhapaleSiddheshwar g.	
TA 07	/Gore GauriRamchandra		TA 45	KhyadeAmitRajendra	
TA 08	/KothawaleShivani Sanjay		TA 46	KodagVasudevDattatray	
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TA 10	AtreShrirangRajendra		TA 48	KulkarniChaitanyaLaxmikant	
TA 11	AutadeDashrathMadhukar		TA 49	Mane Mahesh Gunvant	
TA 12	BagwanMudaserMahebob		TA 50	NagrasPranilPrakash	
TA 13	Bandai Prathamesh M.		TA 51	PanditYogeshDhananjay	
TA 14	BhiseAkashNamdev		TA 52	PangudwalePurveshPrakash	
TA 15	ChavanSurajBaban		TA 53	Patil Ganesh Basavaraj	
TA 16	DandwateRushikesh Prasad		TA 54	PatilAshutosh Sunil	
TA 17	DeshmaneRushikesh Sanjay		TA 55	PawarAniketSantosh	
TA 18	DevkateSachinKisan		TA 56	PawarDayanandYogesh	
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TA 20	DhumalVikasVitthal		TA 58	Rode VaibhavBalasaheb	
TA 21	GahirwarPawansingKiransing		TA 59	SapkalNishklankZumbar	
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TA 28	GhadgeOnkarDhananjay		TA 66	Shinde SaurabhMahadev	
TA 29	Gore OmkarRajkumar		TA 67	Sirsat Anna Yuvraj	
TA 30	Gosavi Dada Prakash		TA 68	Sonar Sunil Ravindra	
TA 31	GundOmkarShahaji		TA 69	TadmareSwapnilSanjaykumar	
TA 32	HonkandeRohan Ramesh		TA 70	VibhuteRushikeshNandkumar	
TA 33	Jadhav AjinkyaArjun		TA 71	WasnikHarshalPrakash	
TA 34	Jadhav RushikeshKalyan		TA 72	**GhugeHrushikeshRavindra**	
TA 35	MangruleVedant D.		TA 73	**GavaliShubhamAmol**	
TA 36	Jundale Rahul Rajkumar		TA 75	**Jadhav Vivek sajjan**	
TA 37	Kadam ShubhamJaimilind		TA 76	**SatheShubhamBhalchandra**	
TA 38	KakadeShubhamMadhukar				

(Prof.S. N. More)
Class Coordinator

(Dr. S.A.Sonawane)
Head, Mech. Engg. Dept.

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 22/09/2019

We undersigned students of T.E. Mech. (B) div. are hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Aurangabad on 26th to 28th September 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 22/09/2019 in presence of Prof. K. S. Pukale, Prof. V.R. Chavan, Prof. C.K. Vhare, Prof. K.B.Jundale, /Prof. A.S Pathan.

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
TB 01	/Ashture Chandraprabha Balaji		TB 37	Pandhare Rohan Anil	
TB 02	/Bhosale Pranoti Ramchandra		TB 38	Parkam Pavan Shashikant	
TB 03	/Deomare Nikita Narayan		TB 39	Tanage Prashant Sambhaji	
TB 04	/Kambale Pooja Dilip		TB 40	Pavase Mayur Santosh	
TB 05	/Nistane Shweta Shadashiv		TB 41	Pophale Pratap Ashok	
TB 06	Waghmode Pradyumna Dinesh		TB 42	Raut Shubham Anil	
TB 07	Kolekar Vijay Mahadeo		TB 43	Raut Yogesh Dattatray	
TB 08	Adalinge Rohit Chandrakant		TB 44	Salgar Laxman Balaso	
TB 09	Nagane Amol Mahadeo		TB 45	Salgar Ram Balaso	
TB 10	Chavan Dinesh Uttam		TB 46	Tamboli Arbaj Jabbar	
TB 11	Dandage Vaibhav Nagnath		TB 47	Sansare Sanket Manojkumar	
TB 12	Takale Akshay Angad		TB 48	Shinde Mahesh Vilas	
TB 13	Dhage Shantanu Prakash		TB 49	Shelake Girish Dnyaneshwar	
TB 14	Vhankalas Avinash Bhaskar		TB 50	Shaikh Nihal Naushad	
TB 15	Ingale Pratik Vasantrao		TB 51	Thakare Bhushankumar D.	
TB 16	Sathe Akshay Sunil		TB 52	Shinde Abhijeet Ashok	
TB 17	Jadhav Vaibhav Satish		TB 53	Shinde Abhishek Amar	
TB 18	Tuljapurkar Gaurav Jayant		TB 54	Tate Rutvik Bramhadev	
TB 19	Valsange Akash Somanath		TB 55	Waghmare Dipak Subhash	
TB 20	Kshirsagar Abhishek Prakash		TB 56	Shrigadi Swamisamarth V.	
TB 21	Kumbhar Ganesh Naganath		TB 57	Telang Sanket Satish	
TB 22	Kumbhar Pratikesh Pramod		TB 58	Bansode Shubham Dattatray	
TB 23	Lad Varad Anil		TB 59	Bhosale Saurabh Namadev	
TB 24	Kale Raviraj Yuvaraj		TB 60	Bhadane Rahul Madhukar	
TB 25	Langote Shubham Sambhaji		TB 61	Chidrewar Gavesh Pandurang	
TB 26	Magi Prasad Dattatray				
TB 27	Mandwale Pratiksinh S.				
TB 28	Jadhav Ruturaj Satish				
TB 29	Masal Samadhan Dadaso				
TB 30	Mulani Aftab Iqbal				
TB 31	Mulani Shahid Mahammad				
TB 32	Mulani Vasim Jahangir				
TB 33	Muthawat Kedar Sanjay				
TB 34	Thite Prem Ganesh				
TB 35	Nayaku Akshay Laxman				
TB 36	Nimgire Piyush Dadasaheb				

(Prof. K.B. Jundale)
Class Coordinator

(Dr. S.A. Sonawane)
Head, Mech. Engg. Dept.

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, **NAAC** Accreditated Institute, ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/Mech/2019-20/203 Date:- 25/09/2019

To,
Arnab Bhattacharjee
Engineer (Trg.)
MSME TECHNOLOGY CENTRE,
Indo German Tool Room, Aurangabad
Maharashtra, Pin: 431 107

Sub: - About Industrial Visit

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All four UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

As per the Third Year syllabus for the subject, Metrology And Mechanical Measurements, we need to organize an Industrial Visit. Our students are interested to visit the Indo German Tool Room, at Aurangabad which is under your supervision. Kindly grant permission **for 8 Faculty members** along with the **120 students** to visit your place on **27th September** and **28th September 2019.**

We will remain grateful to you if give chance for industrial visit.

Thanking you,

Yours faithfully,
S A S
(Dr. S. A. Sonavane)
HOD(MECH.Engg.Dept.)
HEAD,
Dept. of Mechanical Engg.
C.O.E. Pandharpur.

Visited
(A. Bhattacharjee)
INDO GERMAN TOOL ROOM
AURANGABAD.

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute, ISO 9001:2015 Certified Institute,
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/Mech/2019-20/202 Date:- 25/09/2019

To,
The Deputy Executive Engineer,
MSPGCL Paithan Hydropower Station,
Paithan, Aurangabad,
Maharashtra, Pin: 431 107

Sub: - About Industrial Visit

Respected Sir,

Hope this letter finds you in good health and pleasant mood.

It gives me immense pleasure to put before you few words about our institute. Shri Vithal Education and Research Institute (SVERI), a Charitable Trust formed by devoted technocrats, established its first project, College of Engineering, Pandharpur in 1998 with approval from AICTE, New Delhi and Government of Maharashtra. All four UG courses of our college are accredited by NBA. The Engineering College is accredited by NAAC, TCS, The Institution of Engineers (India), Kolkata and is also ISO 9001:2015 Certified. To continue with the developmental process, the trust has started College of Pharmacy and College of Pharmacy (Poly.) from academic year 2006-07 and also College of Engineering (Poly.) from the academic year 2008-09. The college administration is striving hard to provide the best facilities to the students along with the quality education. Every year our students are grabbing 10-12 University ranks. Campus placement rate of our college is also very high.

As per the Third Year syllabus for the subject, Fluid Machinery and Fluid Power, we need to organize an Industrial Visit. Our students are interested to visit the Hydro-Electric Power Station at Paithan, which is under your supervision. Kindly grant permission **for 8 Faculty members** along with the **120 students** to visit your place on **27th September** and **28th September 2019.**

We will remain grateful to you if give chance for industrial visit.

Thanking you,

Yours faithfully,

SAS
(Dr. S. A. Sonavane)
Head. Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg.
C.O.E. Pandharpur.

Total 126 Students visited on 27 & 28.09.19. at Paithan HPS.

A.E. / Paithan HPS

Assistant Engineer
MSPGCL, Paithan HPS

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR

DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20 SEM: II CLASS: T. E. (MECH) DIV: A W.e.f. 26/12/2019

Industrial Visit at Indo German Tool Room Aurangabad

Date:-27/09/2019

Sr.No	Roll No.	Name of Student	Sign	Sr.No	Roll No.	Name of Student	Sign
1	TA 01	/BhumkarManasi Dinesh		42	TA 44	KhapaleSiddheshwar g.	
2	TA 02	/ChavanSonaliUmesh		43	TA 45	KhyadeAmitRajendra	
3	TA 03	/GhogaleMansi Sanjay		44	TA 46	KodagVasudevDattatray	
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5	TA 05	/MhetreShubhadaShantanu		46	TA 48	KulkarniChaitanyaLaxmikant	
6	TA 06	/Gavali Anjali Pandurang		47	TA 49	Mane Mahesh Gunvant	
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13	TA 13	Bandai Prathamesh M.		54	TA 57	PawarPruthviraj Deepak	
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17	TA 17	DeshmaneRushikesh Sanjay		58	TA 62	ShaikhJunedRamjan	
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19	TA 19	DevkateYogeshwarArvind		60	TA 64	ShejalSamadhanNagnath	
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27	TA 27	GhadageVaibhavPrabhakar		68	TA 73	GavaliShubhamAmol	
28	TA 28	GhadgeOnkarDhananjay		69	TA 75	Jadhav Vivek sajjan	
29	TA 29	Gore OmkarRajkumar		70	TA 76	SatheShubhamBhalchandra	
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39	TA 41	Kale VaibhavPandurang					
40	TA 42	KambirePankajPopat					
41	TA 43	KhadakePrajwal Sunil					

Sign Of C.C
(Prof.S.N.More)

Sign Of H.O.D
(Dr.S.A.Sonawane)

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20 SEM: II CLASS: T. E. (MECH) DIV: A W.e.f. 26/12/2019

Industrial Visit at Jayakwadi Hydro Power Station Paithan Dist. Aurangabad

Date:-28/09/2019

Sr.No	Roll No.	Name of Student	Sign	Sr.No	Roll No.	Name of Student	Sign
1	TA 01	/BhumkarManasi Dinesh		42	TA 44	KhapaleSiddheshwar g.	
2	TA 02	/ChavanSonaliUmesh		43	TA 45	KhyadeAmitRajendra	
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Sign Of C.C
(Prof.S.N.More)

Sign Of H.O.D
(Dr.S.A.Sonawane)

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR

DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20 SEM: II CLASS: T. E. (MECH) DIV: B W.e.f. 26/12/2019

Industrial Visit at Indo German Tool Room Aurangabad

Date:-27/09/2019

No	Roll No.	Name of Student	Sign	Sr.No	Roll No.	Name of Student	Sign
1	TB 01	/Ashture Chandraprabha Balaji		33	TB 40	Pavase Mayur Santosh	
2	TB 02	/Bhosale Pranoti Ramchandra		34	TB 41	Pophale Pratap Ashok	
3	TB 03	/Deomare Nikita Narayan		35	TB 42	Raut Shubham Anil	
4	TB 04	/Kambale Pooja Dilip		36	TB 43	Raut Yogesh Dattatray	
5	TB 05	/Nistane Shweta Shadashiv		37	TB 46	Tamboli Arbaj Jabbar	
6	TB 06	Waghmode Pradyumna Dinesh		38	TB 47	Sansare Sanket Manojkumar	
7	TB 07	Kolekar Vijay Mahadeo		39	TB 48	Shinde Mahesh Vilas	
8	TB 08	Adalinge Rohit Chandrakant		40	TB 49	Shelake Girish Dnyaneshwar	
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10	TB 10	Chavan Dinesh Uttam		42	TB 51	Thakare Bhushankumar D.	
11	TB 12	Takale Akshay Angad		43	TB 53	Shinde Abhishek Amar	
12	TB 13	Dhage Shantanu Prakash		44	TB 54	Tate Rutvik Bramhadev	
13	TB 14	Vhankalas Avinash Bhaskar		45	TB 56	Shrigadi Swamisamarth V.	
14	TB 16	Sathe Akshay Sunil		—	—	—	—
15	TB 17	Jadhav Vaibhav Satish		46	TB 58	Bansode Shubham Dattatray	
16	TB 18	Tuljapurkar Gaurav Jayant		47	TB 59	Bhosale Saurabh Namadev	
17	TB 19	Valsange Akash Somanath		48	TB39	Tamage Prashant	
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25	TB 31	Mulani Shahid Mahammad					
26	TB 32	Mulani Vasim Jahangir					
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30	TB 36	Nimgire Piyush Dadasaheb					
31	TB 37	Pandhare Rohan Anil					
32	TB 38	Parkam Pavan Shashikant					

Sign Of C.C
(Prof.K.B.Jundale)

Sign Of H.O.D
(Dr.S.A.Sonawane)

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR

DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20 SEM: II CLASS: T. E. (MECH) DIV: B W.e.f. 26/12/2019

Industrial Visit at Jayakwadi Hydro Power Station Paithan Dist. Aurangabad

Date:-28/09/2019

No	Roll No.	Name of Student	Sign	Sr.No	Roll No.	Name of Student	Sign
1	TB 01	/Ashture Chandraprabha Balaji		33	TB 40	Pavase Mayur Santosh	
2	TB 02	/Bhosale Pranoti Ramchandra		34	TB 41	Pophale Pratap Ashok	
3	TB 03	/Deomare Nikita Narayan		35	TB 42	Raut Shubham Anil	
4	TB 04	/Kambale Pooja Dilip		36	TB 43	Raut Yogesh Dattatray	
5	TB 05	/Nistane Shweta Shadashiv		37	TB 46	Tamboli Arbaj Jabbar	
6	TB 06	Waghmode Pradyumna Dinesh		38	TB 47	Sansare Sanket Manojkumar	
7	TB 07	Kolekar Vijay Mahadeo		39	TB 48	Shinde Mahesh Vilas	
8	TB 08	Adalinge Rohit Chandrakant		40	TB 49	Shelake Girish Dnyaneshwar	
9	TB 09	Nagane Amol Mahadeo		41	TB 50	Shaikh Nihal Naushad	
10	TB 10	Chavan Dinesh Uttam		42	TB 51	Thakare Bhushankumar D.	
11	TB 12	Takale Akshay Angad		43	TB 53	Shinde Abhishek Amar	
12	TB 13	Dhage Shantanu Prakash		44	TB 54	Tate Rutvik Bramhadev	
13	TB 14	Vhankalas Avinash Bhaskar		45	TB 56	Shrigadi Swamisamarth V.	
14	TB 16	Sathe Akshay Sunil		-	-	-	
15	TB 17	Jadhav Vaibhav Satish		46	TB 58	Bansode Shubham Dattatray	
16	TB 18	Tuljapurkar Gaurav Jayant		47	TB 59	Bhosale Saurabh Namadev	
17	TB 19	Valsange Akash Somanath		48	TB39	Tamage Prashant	
18	TB 21	Kumbhar Ganesh Naganath					
19	TB 23	Lad Varad Anil					
20	TB 24	Kale Raviraj Yuvaraj					
21	TB 25	Langote Shubham Sambhaji					
22	TB 26	Magi Prasad Dattatray					
23	TB 28	Jadhav Ruturaj Satish					
24	TB 30	Mulani Aftab Iqbal					
25	TB 31	Mulani Shahid Mahammad					
26	TB 32	Mulani Vasim Jahangir					
27	TB 33	Muthawat Kedar Sanjay					
28	TB 34	Thite Prem Ganesh					
29	TB 35	Nayaku Akshay Laxman					
30	TB 36	Nimgire Piyush Dadasaheb					
31	TB 37	Pandhare Rohan Anil					
32	TB 38	Parkam Pavan Shashikant					

Sign Of C.C
(Prof.K.B.Jundale)

Sign Of H.O.D
(Dr.S.A.Sonawane)

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Industrial Visit Report

Date: 28/09/2019

To,

The Principal,

College of Engineering,

Pandharpur.

Subject: Report of industrial visit

Respected sir,

As per the curriculum laid by Solapur university, Solapur for S.Y.B.Tech Mechanical Engineering Part-I, Manufacturing Process Subject include industrial visit in this regard 131 students along with 08 faculty member visited,

1) Kedar Foundry Pvt.Ltd.Palus MIDC, Palus
2) Sadamate Forging Pvt.Ltd Palus MIDC, Palus

On 19th Sept. 2019. During visit, we had seen various foundry processes and its significance also we have seen different forging operations. From this industrial visit student got practical exposure to foundry and forging operations and they got satisfied with the visit.

This is for your kind information and needful action.

Thanking you

(Prof. B.D.Gaikwad)

MP Subject Teacher

S.Y.B.Tech (Mech) Div. A and B

(/Prof.P.K.Patil)

MP Subject Teacher

S.Y.B.Tech (Mech) Div. C

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Industrial Visit Report

Date: 28/09/2019

To,

The Principal,

College of Engineering,

Pandharpur.

Subject: Report of industrial visit

Respected sir,

As per the curriculum laid by Solapur university, Solapur for S.Y.B.Tech Mechanical Engineering Part-I, Internal combustion Engines Subject include industrial visit in this regard 131 students along with 08 faculty member visited Rocket Engineering Ltd. Kolhapur on 20th Sept. 2019. During visit we had seen assembly of diesel Engines. Also we had seen performance measurement procedure of diesel engine. From this industrial visit student got practical knowledge about assembly of diesel engines they got satisfied with the visit.

This is for your kind information and needful action.

Thanking you

28/9/19

(Prof.S.S.Jadhav)

ICE Subject Teacher

S.Y.B.Tech (Mech) Div. A and B

(/Prof.V.G.Kalebag)

ICE Subject Teacher

S.Y.B.Tech (Mech) Div. C

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Date: 11/09/2019

To

Dean Students,

College of Engineering,

Pandharpur.

Subject: Permission for industrial visit of S.Y. B. Tech (Mechanical Div- A, B & C)

Respected Sir,

As per the curriculum laid down by Solapur University, Solapur for S.Y. B. Tech (Mechanical (Part-I), the subjects of 'Manufacturing Processes and Internal Combustion Engines' include industrial visits. In the processing of same, we had sent letters to related Rocket Engineering, Kolhapur, Sadamate Industries, Plot No. 66, Paius Dist- Sangali and Kedar Foundry, Palus asking permission to visit their organizations. In response, permissions were granted by same.

We request you to grant us the permission to arrange visit of S.Y. B. Tech Mechanical Div- A, B & C on 19th & 20th of September 2019.

Thanking you.

Yours Sincerely,

(Prof. B. D. Gaikwad)	(/Miss. P. K. Patil)	(Mr. S. S. Jadhav)
Subject Teacher-MP	Subject Teacher-MP	Subject Teacher-ICE
(/Miss. V. G. Kalebag)	(Mr. S.J. Shinde)	(Mr. C. C. Jadhav)
Subject Teacher-ICE	CC- S. Y. B. Tech- A	CC- S. Y. B. Tech- B

Respected Sir,
As per syllabus of S.Y. BTech Mech. Engg., students has to visit foundry & engine manufacturing industry for the subject manufacturing process & I.C. Engine respectively. You are requested to please approve the same. The detailed schedule is attached herewith.
14/09/19

Enclosures:

1) Copy of syllabus
2) Permission from industries
3) Schedule of visit
4) List of staff accompanying the visit

Recommended for visit as per schedule
Attached herewith

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y.B. Tech.(Mechanical Engineering) Semester-III

ME213 MANUFACTURING PROCESSES

TeachingScheme	**ExaminationScheme**
	ESE: 70 Marks
Theory:3Hrs/week	**ISE – 30Marks**
Practical:2Hrs/week	**ICA:** 25Marks

- **CourseIntroduction:**

This course covers all primary manufacturing processes like casting, forging, rolling, extrusion and Drawing along with Fabrication. These processes are basics of Mechanical Engineering Programme. The basics of this processes along with their applications and equipment and machinery required for the processes is covered in brief. This course also introduces Manufacturing Techniques for plastic products. Recent trends in various processes are also discussed inbrief.

- **Course Perquisite:** Fundamentals of Mechanics, force, power and mechanical properties of materials, thermal properties of materials is required to be known to the candidate undergoing to thecourse.

- **CourseObjective:**

1. Tointroducetothestudentsthecastingtechniqueanditssignificanceinmanufacturing.
2. Tointroducetothestudentswithvariousplasticdeformationprocessesandtheirapplication.
3. To introduce to the students the various fabrication techniques and their significance in Industry.
4. To introduce to the students with various plastic manufacturingprocesses.
5. To introduce to the students with recent trends in thisprocesses.

- **Course Outcomes:** At the end of this course, the students will be ableto

1. Select appropriate manufacturing process for a givencomponent.
2. Understand performance of eachprocess.
3. Prepare manufacturing plan for the givencomponent.

SECTION I

UNIT-1 Casting Processes **No. of lectures-06**

- Definition of casting, Basic steps in casting processes, Advantages,limitationsand applications of casting process, General introduction to patterns, Types of patterns, materials used, Allowances, Core, core boxes and types of cores and core boxes,molding materials and its properties, Gating system, types of risers, Function of riser. , method to improve efficiency ofrisers.Riser design simple numerical problems.

UNIT-2 Molding processes **No. oflectures-09**

- Green sand molding (hand and machine molding), Shell molding, Investment casting, centrifugal casting, , gravity and pressure die castingprocesses.
- Induction furnace construction and working in brief of melting furnaces such as Cupola, Arc furnaces, induction furnaces, Crucible, oil and gas fired furnaces.

UNIT-3 Fettling, Cleaning and Inspection ofCastings **No. oflectures-05**

- Need for fettling, stages in fettling, equipments used infettling and cleaning of castings, Common important defects in castings. Inspection procedure, Computer applications in foundry processes, foundry,Mechanization.

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SECTION II

No. oflectures-07

UNIT-5 Conventional Forming Processes:

- Introduction to forming process, Classification of forming processes, forging, types of forging, simple numerical problem on upset forging. Extrusion,Types – direct extrusion, indirect extrusion, impact extrusion, hydrostatic extrusion, Wire drawing process,Methods of tubedrawing, hot rolling, cold rolling of sheets, classification of Rolling mills, theory of rolling, simple numerical problems on rolling.

No. oflectures-05

UNIT-6Advanced Forming Processes:

- Introduction to advanced forming process, High energy rate forming process- explosive, electro-hydraulic, magnetic pulse forming. Forming with hydrostatic pressure- hydro-mechanical and hydro forming process.

No. oflectures-08

UNIT–6 Introduction toJoiningprocesses

- Welding processes, classification of welding process, arc welding, welding rod selection, TIG welding & MIG welding, submerged arc welding, gas welding, resistance welding, Brazing andsoldering.

- **Internal Continuous Assessment(ICA):**
  1. Design of pattern and core for a simple component.
  2. Testing of silica sand for grain fineness and claycontent.
  3. Testing of green sand for green compression strength, permeability.
  4. Study of moldfor moisturecontent and core hardness tester.
  5. Study of manufacturing sequence of upset forging with example.
  6. Study of VI characteristic of welding process.
  7. Visit to Foundryunit.
  8. Visit to forgingshop.

- **TextBooks:**
  1. Heine, Lopar, Rosenthal, Principles of MetalCasting.
  2. N.D. Titov, FoundryPractice.
  3. P.L. Jain, Principles of FoundryTechnology.
  4. P.N.Rao, Manufacturing Technology: Foundry, Forming andWelding.
  5. Production Technology by P.C.Sharma

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S.Y.B. Tech. (Mechanical Engineering) Semester-III
ME215 – B: Professional Elective -I
Internal Combustion Engine

Teaching Scheme
Theory: 3 Hrs/week
Practical: 2 Hrs/week

Examination Scheme
ESE: 70 Marks
ISE: 30 Marks
ICA: 25 Marks

Course Objectives:
During this course, student is expected
1. Distinguish the different types of engine constructions and their thermodynamic principles.
2. Differentiate the constructional details of various fuel systems used in different types of I. C. Engines and calculate major dimensions of carburetor and fuel injection system.
3. Apply the basic knowledge to infer the different methods for enhancing the performance of I. C. engines
4. Correlate the difference in SI and CI engine combustion processes with the design of combustion chambers used in these engines
5. Evaluate the performance parameters of I. C. engines to justify their use in different applications.
6. Categorize different alternative fuels suitable for different engine applications and compare the pollutants formed in these engines and their control methods

Course Outcomes:
At the end of this course, student will be able to
1. Recognize and understand the reasons for differences in the construction of different types of internal combustion engines.
2. Understand the reasons for differences among operating characteristics of different engine types and designs
3. Select the appropriate engine for a given application.
4. Conduct performance tests on engines and Compare experimental results with Theoretical predictions.
5. Compare experimental results with theoretical predictions and make proper justifications.

Section I

Unit 1 - Introduction to I. C. Engine No of lectures – 05
Introduction, Classification of I.C. Engines, Engine Cycles-Otto and Diesel Cycle, Valve timing diagram for high and low speed engines, Port timing diagram for two strokes S.I. Engines.

Unit 2–Fuel System for S. I. Engines No of lectures – 06
Engine fuel requirements, Mixture requirements, Simple carburetor, and Additional systems in modern carburettor, compensating devices, Calculation of air fuel ratio (exact and approximate methods), Calculation of main dimensions of air and fuel supply (Numerical calculations of main dimensions of carburetor), Electronic Petrol injection system (MPFI).

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Unit 3–Fuel System for C. I. Engines No of lectures – 05
Requirements of fuel injection system for C.I. Engines, Types of injection systems-Individual pump, Common rail and Distributor systems, Unit injector, Types of fuel nozzles- single hole, multihole, pintle and pintaux, CRDI.

Unit 4–Supercharging No of lectures – 04
Purpose of supercharging, Turbo charging, Thermodynamic cycle of supercharged and turbocharged Engines, Advantages and disadvantages, Limits of supercharging for S.I. and C.I. Engines.

Section II

Unit 5–Combustion in SI Engine No of lectures – 05
Stages of combustion in S.I. Engines, Ignition lag, Flame propagation, Factors affecting flame speed, Abnormal combustion, Octane number, HUCR, Requirements of combustion chambers of S.I. Engines and its types.

Unit 6–combustion in C.I. Engines No of lectures – 05
Stages of combustion in C.I. Engines, Delay period, Abnormal Combustion-Diesel knock, Requirements of combustion chambers for C.I. Engines and its types. Comparison of abnormal combustion in S I and C I Engines. Cetane number.

Unit 7 –Engine performance No of lectures – 05
Performance parameters, Measurement of performance parameters like torque, power, and Volumetric Efficiency, Mechanical Efficiency, bsfc, Brake and Indicated Thermal efficiencies. Heat Balance Sheet. (Numerical on engine Performance and Heat Balance Sheet).

Unit 8–Alternative Fuels and Engine Emission No of lectures – 05
Various alternative fuels and their suitability for I. C. Engines.S.I. Engine emissions (HC, CO, NOx),.C.I. Engines Emissions (CO, NOx, Smog, Particulate), Bharat Norms

TERM WORK

Term work (minimum 3 from group A and B, and all from Group C)
Group A (Study Group)
i. Constructional details of I.C. engines
ii. Study of Engine Cooling and Lubrication system
iii. Study of Ignition systems and Starting systems
iv. Study of fuel system for S.I. and C. I. engines
Group B (Trial Group)
i. Constant Speed Test (Influence of load on performance)
ii. Morse Test
iii. Heat balance sheet
iv. Test on computer controlled I.C. Engine/ Variable Compression Ratio Engine
v. Measurement of exhaust emissions of SI / CI engines
Group C
i. Assignment on recent trends in IC Engine.
ii. Visit to an engine manufacturing company / repairing unit.

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Department of Mechanical Engineering

Schedule of Industrial Visit

S. Y. B. Tech Mechanical- Div- A, B & C

Date: 19th & 20th September 2019

Sr. No.	Activity	Date	Time
1	Departure from Pandharpur	19/09/2019	5:00 am
2	Arrival at Palus Dist- Sangli		10:00 am
3	Breakfast & Tea at Palus Dist- Sangli		10:00 to 11:30 am
4	Visit to Kedar Foundry & Sadamate Industries, Plot No. 66		11:30 am to 3 pm
5	Departure from Palus to Gandharv, Kolhapur		04: 00 pm
6	Departure from Gandharv, Kolhapur	20/09/2019	09:30 am
7	Arrival at Rocket Engineering, Kolhapur		10:30 am
8	Visit to Rocket Engineering, Kolhapur		11:00 am to 01:30 pm
9	Lunch at Kolhapur		01:30 pm to 3 pm
10	Departure from Kolhapur to Pandharpur		3 pm

(Prof. B. D. Gaikwad)
Subject Teacher-MP

(/Miss. P. K. Patil)
Subject Teacher-MP

(Mr. S. S. Jadhav)
Subject Teacher-ICE

(/Miss. V. G. Kalebag)
Subject Teacher-ICE

(Mr. S. J. Shinde)
CC- S. Y. B. Tech- A

(Mr. C. C. Jadhav)
CC- S. Y. B. Tech- B

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 11//09/2019

We undersigned students of S. Y. B. Tech. Mechanical (A) div. hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Palus and Kolhapur on 19th & 20th September 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 11/09/19 in presence of Prof. B. D. Gaikwad, Prof. S. J. Shinde, Prof. A. K. Parkhe, Prof. C. C. Jadhav, /Prof. P. K. Patil, Prof. R. D. Solage, Prof. S. S. Jadhav

Roll No.	Name of Student	Sign.	Roll No. No.	Name of Student	Sign.
SA 01	/Achugatla Komal		SA 26	Gaikwad Vaibhav Nanasaheb	
SA 02	/Gajakosh Shradhha Dattatray		SA 27	Gaikwad Vaibhav Ramdas	
SA 03	/Joshi Gayatri Vinayak		SA 28	Ghadage Prakash Bhimrao	
SA04	/Lakheri Vaishnavi Mahesh		SA 29	Shelar Yuvraj Vinod	
SA 05	/Mirjkar Saleha Salim		SA 30	Satapute Rahul Rajaram	
SA 06	/Parchandrao Madhuri		SA 31	Godse Rutik Ramesh	
SA 07	/Parvat Namrata Raju		SA 32	Patil Rushikesh Vidyadhar	
SA 08	/Sathe Deepjyoti Dattatray		SA 33	Hambirrao Kiran Vinayak	
SA 09	/Tarapurkar Rutuja Suresh		SA 34	Jagadale Milind Shashikant	
SA 10	Admane Dhananjay Rajendra		SA 35	Parchandrao Chandragupt V.	
SA 11	Sul Amol Dhondiba		SA 36	Jatkar Prathamesh Manohar	
SA 12	Bansode Dnyaneshwar		SA 37	Joshi Atharv Santosh	
SA 13	Jadhav Atish Balaso		SA 38	Kadasare Saurabh Bandu	
SA 14	Burungale Bharat Dnyandev		SA 39	Kale Ayush Nitin	
SA 15	Chavan Samarth Suresh		SA 40	Khandagale Rohit Ananda	
SA 16	Chavan Saurabh Chandrakant		SA 41	Kirgat Prathmesh Ramesh	
SA 17	Chavan Shreeyash Rajaram		SA 42	Kshirsagar Sachin Ashok	
SA 18	Chavan Yogesh Prakash		SA 43	Pansare Akshay Balasaheb	
SA 19	Chavare Sumeet Suhas		SA 44	Misal Mangesh Mahavir	
SA 20	Chitari Ghanasham		SA 45	More Suraj Dattatray	
SA 21	Dandage Omkar Babaso		SA 46	Motewar Aditya Vyankatesh	
SA 22	Deokar Onkar Rajendra		SA 47	Mundhe Nikhil Dilip	
SA 23	Deshmukh Pruthviraj		SA48	Narute Bhushan Narayan	
SA 24	Todkar Ganesh Shankar		SA49	Waghmare Sachin Dattatray	
SA 25	Gadekar Yash Yuvraj		SA50	Disale Pranay	

11/9/19

(Prof. S. J. Shinde)

Class Co-ordinator-SE A

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 11/09/2019

We undersigned students of S. Y. B. Tech. Mechanical (B) div. hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Palus and Kolhapur on 19th & 20th September 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 11/09/19 in presence of Prof. B. D. Gaikwad, Prof. S. J. Shinde, Prof. A. K. Parkhe, Prof. C. C. Jadhav, /Prof. P. K. Patil, Prof. R. D. Solage, Prof. S. S. Jadhav

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SB 01	/Deshpande Samruddhi		SB 28	Metkari Om Damodar	
SB 02	/EkatpurePreranaShrirang		SB 29	Mulani Aman Allauddin	
SB 03	/LaleArati Gajanan		SB 30	NagtilakHarshal Rajendra	
SB 04	/Mane Snehal Digambar		SB 31	NanawareJaydev Dipak	
SB 05	/More Vaishali Dilip		SB 32	Nikam Saurabh Sanjay	
SB 06	/SonawaneDhanashree Bharat		SB 33	Parmar Ridham Girish	
SB 07	Vidhate Rohit Dattatraya		SB 34	Patil Madan Kalyan	
SB 08	Wadekar Saurabh Ganesh		SB 35	Patil Santosh Hanamant	
SB 09	BankarAdeshGorakh		SB 36	Patil Yogesh Kumar	
SB 10	Bansode Aniket Annaso		SB 37	Pawar Omkar Santosh	
SB 11	Bapat Vinayak Vishnu		SB 38	Pawar Shubham Uttam	
SB 12	Bhosale Hritik Ramesh		SB 39	Rai Hrishav Raj	
SB 13	Bhosale Vaibhav Rajendra		SB 40	Rohit DattatryChatage	
SB 14	Deshmukh Pratik Pravin		SB 41	Yasar Yusuf Khatik	
SB 15	Dhotre Sourabh Sanjay		SB 42	SarakKashilingKalidas	
SB 16	Dixit Manthan Milind		SB 43	Saravale Aniket Rajkumar	
SB 17	Gaikwad Abhinay Rajendra		SB 44	Shaikh Aftab Bashir	
SB 18	Gavali Suraj Rajendra		SB 45	Shaikh Salim Husen	
SB 19	Waghmode Chetan		SB 46	Shinde Dipak Pandurang	
SB 20	WaghmodeDhondiram		SB 47	Shinde Nanasaheb S.	
SB 21	Kadam Nilesh Sanjay		SB 48	Shinde Vishwajit Ashok	
SB 22	Khote Abhijeet Sunil		SB 49	ShitoleDnyaneshawr Ganpat	
SB 23	Kulkarni Atharv Makarand		SB50	Ubale Harshvardhan Sudhir	
SB 24	Londhe Vaibhav Anil		SB51	Taur Mohit Nagesh	
SB 25	MadaneAvinashAjinath		SB52	KengarSachinUttam	
SB 26	Mali Amol Vijay		SB 53	Langote Krishna S.	
SB 27	Mashalkar Omkar Basavraj				

(Prof.C. C Jadhav)
Class Co-ordinator-SE B

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: I
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 11//09/2019

We undersigned students of S. Y. B. Tech. Mechanical (C) div. hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Palus and Kolhapur on 19th & 20th September 2019. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 11/09/19 in presence of Prof. B. D. Gaikwad, Prof. S. J. Shinde, Prof. A. K. Parkhe, Prof. C. C. Jadhav, /Prof. P. K. Patil, Prof. R. D. Solage, Prof. S. S. Jadhav

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SC 01	Sarwade Karuna Sunil	AB	SC 21	Mulani Irfan Rashid	
SC 02	Surve Prajakta Dharmraj	AB	SC 22	Musale Prajwal Dattatraya	
SC 03	Ajgar Akash Prasad		SC 23	Nagargoje Rambhajee Ramchandra	
SC 04	Autade Yogesh Samrut		SC 24	Padage Pritam Balaji	
SC 05	Bagul Sandip Bhagwan	AB	SC 25	Paras Mahavir Mule	
SC 06	Bhandare Pranav Milind		SC 26	Pawar Shailesh Mahadev	
SC 07	Dhabade Avinash Basavraj		SC 27	Phalake Onkar Haridas	AB
SC 08	Dhere Rupesh Ambrushi	AB	SC 28	Ronge Vivek Dashrath	
SC 09	Eakamalli Nitin Tatya		SC 29	Sadul Sunil Ambadas	
SC 10	Gaikwad Saurabh Shahaji		SC 30	Shaikh Md Aazam Ejaz Ahmed	
SC 11	Gangthade Vishal Ankush		SC 31	Shikalgar Sohel Humayun	
SC 12	Jadhav Sushant Bhausaheb		SC 32	Somadale Pravin Dilip	
SC 13	Jagtap Omkar Chandrakant		SC 33	Thorat Shashikant Dadarao	
SC 14	Koli Akash Revappa		SC 34	Vairagkar Kanhaiya Sudarshan	AB
SC 15	Lavate Dashrath Pandurang		SC 35	Wadekar Chaitanya Dattatray	AB
SC 16	Londhe Avinash Sandipan		SC 36	Waykar Vallabh Trimbak	
SC 17	Mane Akash Sambhaji		SC 37	Patil Onkar Sanjay	
SC 18	Mane-Deshmukh Samarth				
SC 19	Mohammad Sajid Khan				
SC 20	Mujawar Nihal Yusuf				

(Prof. P. K. Patil)
Class Co-ordinator-SE C

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.(02186)- 282223, 9503103892
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
ISO 9001-2000 Certified Institute & Accredited by Institute of Engineers, India,
E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Ref. No.:- COEPR/MECH/19-20/ 173 Date: -29/08/2019

To,
Production Manager,
Shree Kedar Metal Foundries,
Gate no.49, Near Instrial Istate,
Palus ,
Sangali.

Sub: - About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put before you few words regarding our College. Ours is an ISO 9001 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats, runs the College. We offer the following four-year degree courses in Engineering viz. Mechanical Engg., Civil Engg., Electronics & Tele communication Engg. Computer Science & Engg. and Information Technology.

As per our S.Y. B. Tech (Mechanical Engg.) syllabus for Manufacturing processes subject, we want to organize industrial visit to your well reputed organization for getting knowledge about Manufacturing Processes. Our Second year Mechanical students nearly about 143 students are willing to visit your estimated organization. So you are requested to allow us with 143 students of S.Y. B. Tech Mechanical to visit your esteemed organization on 19th Sept. 2019.

We will remain grateful to you if give chance for industrial visit.

Thanking you.

Yours faithfully,

Permitted for visit

SAS
(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg.
C.O.E. Pandharpur.

19/09/19

Shree Kedar Metal Foundries
16 310
Palus

~~9890161065~~
Ganesh . Nalawade
7798115555

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.(02186)- 282223, 9503103892
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
ISO 9001-2000 Certified Institute & Accredited by Institute of Engineers, India,
E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Ref. No.:- COEPR/MECH/19-20/ 172

Date: -29/08/2019

To,
Production Manager,
Sadamate Industries,
Plot no.66, Instrial Istate,
Palus ,
Sangali.

Sub: - About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put before you few words regarding our College. Ours is an ISO 9001 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur. the trust established by group of qualified and experienced Technocrats. runs the College. We offer the following four-year degree courses in Engineering viz. Mechanical Engg., Civil Engg., Electronics & Tele communication Engg. Computer Science & Engg. and Information Technology.

As per our S.Y. B. Tech (Mechanical Engg.) syllabus for Manufacturing processes subject, we want to organize industrial visit to your well reputed organization for getting knowledge about Manufacturing Processes. Our Second year Mechanical students nearly about 143 students are willing to visit your estimated organization. So you are requested to allow us with 143 students of S.Y. B. Tech Mechanical to visit your esteemed organization on 15th Sept. 2019.

We will remain grateful to you if give chance for industrial visit.

Thanking you.

Yours faithfully,

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

HEAD,
Dept. of Mechanical Engg.
C.O.E. Pandharpur.

SADAMATE INDUSTRIS
Plot No. 66, Industrial Estate, PALUS-416 310
TAL.PALUS,DIST.SANGLI

9890161065

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SVERI

Avinash Parkhe <akparkhe@coe.sveri.ac.in>

ɔout Industrial Visit to Rocket Engineering, Kolhapur on 20/09/2019.

nessages

vinash Parkhe <akparkhe@coe.sveri.ac.in> Wed, Sep 4, 2019 at 2:55 PM
ɔ: info@rocket-comet.com

Dear Sir,

First of all, we wish to put forth few words regarding our College. Ours is NBA accredited and an ISO 9001:2008 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats.

As per our **S.Y. B.Tech (Mechanical Engg.)** syllabus for Internal Combustion Engine subject, we want to organize industrial visit to your well reputed industry for getting knowledge about Petrol/Diesel Engine. Our Second year Mechanical students are nearly about 120, who are willing to visit to your estimated organization. So you are requested to permit us to visit your esteemed organization for our **S.Y. B.Tech** Mechanical students along with few Staff members, on **20/09/2019.**

--
Thank You.

Regards,
--
Mr. Avinash K. Parkhe
Assistant Professor
Mechanical Engg. Department
SVERI's College of Engineering, Pandharpur
Tal - Pandharpur- 413 304, Dist - Solapur (Maharashtra)
Cell - 9503632622, 8275447792

Thu, Sep 5, 2019 at 4:11 PM

info <info@rocket-comet.com>
To: Avinash Parkhe <akparkhe@coe.sveri.ac.in>

Dear Sir

Please refer to your mail as under regarding visit of your students to our factory.

As proposed by you, your students can visit our factory on 20/09/2019 at 10.00 AM. After reaching our factory, you may contact Shri Sanjay T.Patil (HR Officer) Mobile No. 9673331103.

Regards

S.T.Patil

Rocket Engineering Corporation Pvt.Ltd., kolhapur.

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref. No.:- COEPR/MECH/19-20/

Date: 20/09/2019

To,

Rocket Engineering,

Corporation Pvt.Ltd.,

kolhapur.

Sub: -About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth few words regarding our College. Ours is NBA accredited and an ISO 9001:2015 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats.

As per our **S.Y. B.Tech (Mechanical Engg.)** syllabus for Internal Combustion Engine subject, we want to organize industrial visit to your well reputed industry for getting knowledge about Petrol/Diesel Engine. Our Second year Mechanical students are nearly about 120, who are willing to visit to your estimated organization. So you are requested to permit us to visit your esteemed organization for our **S.Y. B.Tech** Mechanical students along with few Staff members, on **20/09/2019.**

Yours faithfully,

(Dr. S. A. Sonawane)
Head, Mech Engg. Dept.

DT: 20-9-19
Visited 130 Nos. student &
07 Nos. teacher staf
→ found ok

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216064, 9503103737, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and IQS, Pune ISO 9001:2015 Certified Institute

Ref. No.:- COEPR/MECH/19-20/

Date: 19/09/2019

To,
Sadamate Forging, Pvt.Ltd.,
Palus, Dist - Sangali

Sub: -About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth few words regarding our College. Ours is NBA accredited and an ISO 9001:2015 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats.

As per our **S.Y. B.Tech (Mechanical Engg.)** syllabus for Internal Combustion Engine subject, we want to organize industrial visit to your well reputed industry for getting knowledge about Petrol/Diesel Engine. Our Second year Mechanical students are nearly about 120, who are willing to visit to your estimated organization. So you are requested to permit us to visit your esteemed organization for our **S.Y. B.Tech** Mechanical students along with few Staff members, on **19/09/2019.**

Yours faithfully,

SAS

(Dr. S. A. Sonawane)
Head, Mech Engg. Dept.

132 Students + 3 staff members visited on 19/9/2019.

Sadamate Industries Pvt. Ltd. Palus

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Ref. No.:- COEPR/MECH/19-20/

Date: 19/09/2019

To,

Kedar Foundary, Pvt.Ltd.,

Palus, Dist - Sangali

Sub: -About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth few words regarding our College. Ours is NBA accredited and an ISO 9001:2015 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats.

As per our **S.Y. B.Tech (Mechanical Engg.)** syllabus for Internal Combustion Engine subject, we want to organize industrial visit to your well reputed industry for getting knowledge about Petrol/Diesel Engine. Our Second year Mechanical students are nearly about 120, who are willing to visit to your estimated organization. So you are requested to permit us to visit your esteemed organization for our **S.Y. B.Tech** Mechanical students along with few Staff members, on **19/09/2019.**

Yours faithfully,

SAS

(Dr. S. A. Sonawane)
Head, Mech Engg. Dept.

132 student visited along with 08 faculty members. visited to our company. Dated - 19/09/19

SHREE KEDAR METAL FOUNDRIES, PALUS

Shree Kedar Metal Foundries PALUS

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DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20
CLASS: S. Y. B. Tech. (MECH) DIV: A
Attendance for Industrial Visit to Rocket Engine, Shiroli MIDC, Kolhapur
Date:- 20/09/2019

ll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
A 01	/Achugatla Komal Revansidheshwar		SA 26	Gaikwad Vaibhav Nanasaheb	
A 02	/Gajakosh Shradhha Dattatray		SA 27	Gaikwad Vaibhav Ramdas	
A 03	/Joshi Gayatri Vinayak		SA 28	Ghadage Prakash Bhimrao	
A 04	/Lakheri Vaishnavi Mahesh		SA 29	Shelar Yuvraj Vinod	
A 05	/Mirjkar Saleha Salim		SA 30	Satapute Rahul Rajaram	
SA06	/Parchandrao Madhuri Vinayak		SA 31	Godse Rutik Ramesh	
SA 07	/Parvat Namrata Raju		SA 32	Patil Rushikesh Vidyadhar	
08	/Sathe Deepjyoti Dattatray		SA 33	Hambirrao Kiran Vinayak	
SA 09	/Tarapurkar Rutuja Suresh		SA 34	Jagadale Milind Shashikant	
SA 10	Admane Dhananjay Rajendra		SA 35	Parchandrao Chandragupt V.	
SA 11	Sul Amol Dhondiba		SA 36	Jatkar Prathamesh Manohar	
SA 12	Bansode Dnyaneshwar Rohidas		SA 37	Joshi Atharv Santosh	
SA 13	Jadhav Atish Balaso		SA 38	Kadasare Saurabh Bandu	
SA 14	Burungale Bharat Dnyandev		SA 39	Kale Ayush Nitin	
SA 15	Chavan Samarth Suresh		SA 40	Khandagale Rohit Ananda	
SA 16	Chavan Saurabh Chandrakant		SA 41	Kirgat Prathmesh Ramesh	
SA 17	Chavan Shreeyash Rajaram		SA 42	Kshirsagar Sachin Ashok	
18	Chavan Yogesh Prakash		SA 43	Pansare Akshay Balasaheb	
SA 19	Chavare Sumeet Suhas		SA 44	Misal Mangesh Mahavir	
SA 20	Chitari Ghanasham Shashikant		SA 45	More Suraj Dattatray	
SA 21	Dandage Omkar Babaso		SA 46	Motewar Aditya Vyankatesh	
SA 22	Deokar Onkar Rajendra		SA 47	Mundhe Nikhil Dilip	
SA 23	Deshmukh Pruthviraj Somnath		SA48	Narute Bhushan Narayan	
SA 24	Todkar Ganesh Shankar		SA49	Waghmare Sachin Dattatray	
SA 25	Gadekar Yash Yuvraj		SA50	Disale Pranay	

(Prof. S. J. Shinde)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20
CLASS: S. Y. B. Tech. (MECH) DIV: A
Attendance for Industrial Visit to Kedar Foundry, Palus Date:- 19/09/2019

l No.	Name of Student	Sign	Roll No.	Name of Student	Sign
A 01	/Achugatla Komal Revansidheshwar		SA 26	Gaikwad Vaibhav Nanasaheb	
A 02	/Gajakosh Shradhha Dattatray		SA 27	Gaikwad Vaibhav Ramdas	
A 03	/Joshi Gayatri Vinayak		SA 28	Ghadage Prakash Bhimrao	
A 04	/Lakheri Vaishnavi Mahesh		SA 29	Shelar Yuvraj Vinod	
A 05	/Mirjkar Saleha Salim		SA 30	Satapute Rahul Rajaram	
SA06	/Parchandrao Madhuri Vinayak		SA 31	Godse Rutik Ramesh	
SA 07	/Parvat Namrata Raju		SA 32	Patil Rushikesh Vidyadhar	
08	/Sathe Deepjyoti Dattatray		SA 33	Hambirrao Kiran Vinayak	
SA 09	/Tarapurkar Rutuja Suresh		SA 34	Jagadale Milind Shashikant	
SA 10	Admane Dhananjay Rajendra		SA 35	Parchandrao Chandragupt V.	
SA 11	Sul Amol Dhondiba		SA 36	Jatkar Prathamesh Manohar	
SA 12	Bansode Dnyaneshwar Rohidas		SA 37	Joshi Atharv Santosh	
SA 13	Jadhav Atish Balaso		SA 38	Kadasare Saurabh Bandu	
SA 14	Burungale Bharat Dnyandev		SA 39	Kale Ayush Nitin	
SA 15	Chavan Samarth Suresh		SA 40	Khandagale Rohit Ananda	
SA 16	Chavan Saurabh Chandrakant		SA 41	Kirgat Prathmesh Ramesh	
SA 17	Chavan Shreeyash Rajaram		SA 42	Kshirsagar Sachin Ashok	
18	Chavan Yogesh Prakash		SA 43	Pansare Akshay Balasaheb	
SA 19	Chavare Sumeet Suhas		SA 44	Misal Mangesh Mahavir	
SA 20	Chitari Ghanasham Shashikant		SA 45	More Suraj Dattatray	
SA 21	Dandage Omkar Babaso		SA 46	Motewar Aditya Vyankatesh	
SA 22	Deokar Onkar Rajendra		SA 47	Mundhe Nikhil Dilip	
SA 23	Deshmukh Pruthviraj Somnath		SA48	Narute Bhushan Narayan	
SA 24	Todkar Ganesh Shankar		SA49	Waghmare Sachin Dattatray	
SA 25	Gadekar Yash Yuvraj		SA50	Disale Pranay	

(Prof. S. J. Shinde)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20

CLASS: S. Y. B. Tech. (MECH) DIV: A

Attendance for Industrial Visit to Sadamate Forging, Palus Date:- 19/09/2019

l No.	Name of Student	Sign	Roll No.	Name of Student	Sign
A 01	/Achugatla Komal Revansidheshwar		SA 26	Gaikwad Vaibhav Nanasaheb	
A 02	/Gajakosh Shradhha Dattatray		SA 27	Gaikwad Vaibhav Ramdas	
A 03	/Joshi Gayatri Vinayak		SA 28	Ghadage Prakash Bhimrao	
A 04	/Lakheri Vaishnavi Mahesh		SA 29	Shelar Yuvraj Vinod	
A 05	/Mirjkar Saleha Salim		SA 30	Satapute Rahul Rajaram	
A06	/Parchandrao Madhuri Vinayak		SA 31	Godse Rutik Ramesh	
SA 07	/Parvat Namrata Raju		SA 32	Patil Rushikesh Vidyadhar	
SA 08	/Sathe Deepjyoti Dattatray		SA 33	Hambirrao Kiran Vinayak	
. 09	/Tarapurkar Rutuja Suresh		SA 34	Jagadale Milind Shashikant	
SA 10	Admane Dhananjay Rajendra		SA 35	Parchandrao Chandragupt V.	
SA 11	Sul Amol Dhondiba		SA 36	Jatkar Prathamesh Manohar	
SA 12	Bansode Dnyaneshwar Rohidas		SA 37	Joshi Atharv Santosh	
SA 13	Jadhav Atish Balaso		SA 38	Kadasare Saurabh Bandu	
SA 14	Burungale Bharat Dnyandev		SA 39	Kale Ayush Nitin	
SA 15	Chavan Samarth Suresh		SA 40	Khandagale Rohit Ananda	
SA 16	Chavan Saurabh Chandrakant		SA 41	Kirgat Prathmesh Ramesh	
SA 17	Chavan Shreeyash Rajaram		SA 42	Kshirsagar Sachin Ashok	
SA 18	Chavan Yogesh Prakash		SA 43	Pansare Akshay Balasaheb	
'9	Chavare Sumeet Suhas		SA 44	Misal Mangesh Mahavir	
SA 20	Chitari Ghanasham Shashikant		SA 45	More Suraj Dattatray	
SA 21	Dandage Omkar Babaso		SA 46	Motewar Aditya Vyankatesh	
SA 22	Deokar Onkar Rajendra		SA 47	Mundhe Nikhil Dilip	
SA 23	Deshmukh Pruthviraj Somnath		SA48	Narute Bhushan Narayan	
SA 24	Todkar Ganesh Shankar		SA49	Waghmare Sachin Dattatray	
SA 25	Gadekar Yash Yuvraj		SA50	Disale Pranay	

(Prof. S. J. Shinde)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20

CLASS: S. Y. B. Tech. (MECH) DIV: B

Attendance for Industrial Visit to Sadamate Forging, Palus Date:- 19/09/2019

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SB 01	/Deshpande Samruddhi Rajendra		SB 29	Mulani Aman Allauddin	
SB 02	/EkatpurePreranaShrirang		SB 30	NagtilakHarshal Rajendra	
SB 03	/LaleArati Gajanan		SB 31	NanawareJaydev Dipak	
SB 04	/Mane Snehal Digambar		SB 33	Parmar Ridham Girish	
SB 05	/More Vaishali Dilip		SB 34	Patil Madan Kalyan	
SB 06	/SonawaneDhanashree Bharat		SB 35	Patil Santosh Hanamant	
SB 07	Vidhate Rohit Dattatraya		SB 36	Patil Yogesh Kumar	
SB 08	Wadekar Saurabh Ganesh		SB 37	Pawar Omkar Santosh	
SB 10	Bansode Aniket Annaso		SB 38	Pawar Shubham Uttam	
SB 11	Bapat Vinayak Vishnu		SB 39	Rai Hrishav Raj	
SB 12	Bhosale Hritik Ramesh		SB 40	Rohit DattatryChatage	
SB 13	Bhosale Vaibhav Rajendra		SB 41	Yasar Yusuf Khatik	
SB 14	Deshmukh Pratik Pravin		SB 42	SarakKashilingKalidas	
SB 15	Dhotre Sourabh Sanjay		SB 43	Saravale Aniket Rajkumar	
SB 16	Dixit Manthan Milind		SB 44	Shaikh Aftab Bashir	
SB 17	Gaikwad Abhinay Rajendra		SB 45	Shaikh Salim Husen	
SB 18	Gavali Suraj Rajendra		SB 46	Shinde Dipak Pandurang	
SB 19	Waghmode Chetan		SB 47	Shinde NanasahebSiddheshwar	
SB 20	WaghmodeDhondiram Madhu		SB 48	Shinde Vishwajit Ashok	
SB 21	Kadam Nilesh Sanjay		SB 49	ShitoleDnyaneshawr Ganpat	
SB 22	Khote Abhijeet Sunil		SB50	Ubale Harshvardhan Sudhir	
SB 23	Kulkarni Atharv Makarand		SB51	Taur Mohit Nagesh	
SB 24	Londhe Vaibhav Anil		SB52	KengarSachinUttam	
SB 25	MadaneAvinashAjinath		SB 53	Langote Krishna S.	
SB 26	Mali Amol Vijay				
SB 27	Mashalkar Omkar Basavraj				
SB 28	Metkari Om Damodar				

(Prof. C. C. Jadhav)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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SVERI'S COLLEGE OF E...
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20
CLASS: S. Y. B. Tech. (MECH) DIV: B
Attendance for Industrial Visit to Kedar Foundry, Palus Date:- 19/09/2019

Roll No.	Name of Student	Sign.
SB 01	/Deshpande Samruddhi Rajendra	
SB 02	/EkatpurePreranaShrirang	
SB 03	/LaleArati Gajanan	
SB 04	/Mane Snehal Digambar	
SB 05	/More Vaishali Dilip	
SB 06	/SonawaneDhanashree Bharat	
SB 07	Vidhate Rohit Dattatraya	
SB 08	Wadekar Saurabh Ganesh	
SB 10	Bansode Aniket Annaso	
SB 11	Bapat Vinayak Vishnu	
SB 12	Bhosale Hritik Ramesh	
SB 13	Bhosale Vaibhav Rajendra	
SB 14	Deshmukh Pratik Pravin	
SB 15	Dhotre Sourabh Sanjay	
SB 16	Dixit Manthan Milind	
SB 17	Gaikwad Abhinay Rajendra	
SB 18	Gavali Suraj Rajendra	
SB 19	Waghmode Chetan	
SB 20	WaghmodeDhondiram Madhu	
SB 21	Kadam Nilesh Sanjay	
SB 22	Khote Abhijeet Sunil	
SB 23	Kulkarni Atharv Makarand	
SB 24	Londhe Vaibhav Anil	
SB 25	MadaneAvinashAjinath	
SB 26	Mali Amol Vijay	
SB 27	Mashalkar Omkar Basavraj	
SB 28	Metkari Om Damodar	
SB 29	Mulani Aman Allauddin	
SB 30	NagtilakHarshal Rajendra	
SB 31	NanawareJaydev Dipak	
SB 33	Parmar Ridham Girish	
SB 34	Patil Madan Kalyan	
SB 35	Patil Santosh Hanamant	
SB 36	Patil Yogesh Kumar	
SB 37	Pawar Omkar Santosh	
SB 38	Pawar Shubham Uttam	
SB 39	Rai Hrishav Raj	
SB 40	Rohit DattatryChatage	
SB 41	Yasar Yusuf Khatik	
SB 42	SarakKashilingKalidas	
SB 43	Saravale Aniket Rajkumar	
SB 44	Shaikh Aftab Bashir	
SB 45	Shaikh Salim Husen	
SB 46	Shinde Dipak Pandurang	
SB 47	Shinde NanasahebSiddheshwar	
SB 48	Shinde Vishwajit Ashok	
SB 49	ShitoleDnyaneshawr Ganpat	
SB50	Ubale Harshvardhan Sudhir	
SB51	Taur Mohit Nagesh	
SB52	KengarSachinUttam	
SB 53	Langote Krishna S.	

(Prof. C. C. Jadhav)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20

CLASS: S. Y. B. Tech. (MECH) DIV: B

Attendance for Industrial Visit to Rocket Engine, Shiroli MIDC, Kolhapur

Date:- 20/09/2019

Roll No.	Name of Student	Sign.	Roll No.	Name of Student	Sign.
SB 01	/Deshpande Samruddhi Rajendra		SB 29	Mulani Aman Allauddin	
SB 02	/EkatpurePreranaShrirang		SB 30	NagtilakHarshal Rajendra	
SB 03	/LaleArati Gajanan		SB 31	NanawareJaydev Dipak	
SB 04	/Mane Snehal Digambar		SB 33	Parmar Ridham Girish	
SB 05	/More Vaishali Dilip		SB 34	Patil Madan Kalyan	
SB 06	/SonawaneDhanashree Bharat		SB 35	Patil Santosh Hanamant	
SB 07	Vidhate Rohit Dattatraya		SB 36	Patil Yogesh Kumar	
SB 08	Wadekar Saurabh Ganesh		SB 37	Pawar Omkar Santosh	
SB 10	Bansode Aniket Annaso		SB 38	Pawar Shubham Uttam	
SB 11	Bapat Vinayak Vishnu		SB 39	Rai Hrishav Raj	
SB 12	Bhosale Hritik Ramesh		SB 40	Rohit DattatryChatage	
SB 13	Bhosale Vaibhav Rajendra		SB 41	Yasar Yusuf Khatik	
SB 14	Deshmukh Pratik Pravin		SB 42	SarakKashilingKalidas	
SB 15	Dhotre Sourabh Sanjay		SB 43	Saravale Aniket Rajkumar	
SB 16	Dixit Manthan Milind		SB 44	Shaikh Aftab Bashir	
SB 17	Gaikwad Abhinay Rajendra		SB 45	Shaikh Salim Husen	
SB 18	Gavali Suraj Rajendra		SB 46	Shinde Dipak Pandurang	
SB 19	Waghmode Chetan		SB 47	Shinde NanasahebSiddheshwar	
SB 20	WaghmodeDhondiram Madhu		SB 48	Shinde Vishwajit Ashok	
SB 21	Kadam Nilesh Sanjay		SB 49	ShitoleDnyaneshawr Ganpat	
SB 22	Khote Abhijeet Sunil		SB50	Ubale Harshvardhan Sudhir	
SB 23	Kulkarni Atharv Makarand		SB51	Taur Mohit Nagesh	
SB 24	Londhe Vaibhav Anil		SB52	KengarSachinUttam	
SB 25	MadaneAvinashAjinath		SB 53	Langote Krishna S.	
SB 26	Mali Amol Vijay				
SB 27	Mashalkar Omkar Basavraj				
SB 28	Metkari Om Damodar				

(Prof. C. C. Jadhav)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

Scanned with CamScanner

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20
CLASS: S. Y. B. Tech. (MECH) DIV: C
Attendance for Industrial Visit to Sadamate Forging, Palus **Date:- 19/09/2019**

	Name of Student	Sign	Roll No.	Name of Student	Sign
3	AJGAR AKASH PRASAD		SC 28	RONGE VIVEK DASHRATH	
04	AUTADE YOGESH SAMRUT		SC 29	SADUL SUNIL AMBADAS	
06	BHANDARE PRANAV MILIND		SC 30	SHAIKH MD AAZAM EJAZ AHMED	
07	DHABADE AVINASH BASAVRAJ		SC 31	SHIKALGAR SOHEL HUMAYUN	
09	EAKAMALLI NITIN TATYA		SC 32	SOMADALE PRAVIN DILIP	
10	GAIKWAD SAURABH SHAHAJI		SC 33	THORAT SHASHIKANT DADARAO	
11	GANGTHADE VISHAL ANKUSH		SC 36	WAYKAR VALLABH TRIMBAK	
C 12	JADHAV SUSHANT BHAUSAHEB		SC 37	PATIL OMKAR SANJAY	
C 13	JAGTAP OMKAR CHANDRAKANT				
C 14	KOLI AKASH REVAPPA				
SC 15	LAVATE DASHRATH PANDURANG				
SC 16	LONDHE AVINASH SANDIPAN				
SC 17	MANE AKASH SAMBHAJI				
SC 18	MANE-DESHMUKH SAMARTH BABRUVAHAN				
SC 19	MOHAMMAD SAJID KHAN				
SC 20	MUJAWAR NIHAL YUSUF				
SC 21	MULANI IRFAN RASHID				
SC 22	MUSALE PRAJWAL DATTATRAYA				
SC 23	NAGARGOJE RAMBHAJEE RAMCHANDRA				
SC 24	PADAGE PRITAM BALAJI				
SC 25	PARAS MAHAVIR MULE				
SC 26	PAWAR SHAILESH MAHADEV				

(Prof. P. K. Patil)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20

CLASS: S. Y. B. Tech. (MECH) DIV: A

Attendance for Industrial Visit to Rocket Engine, Shiroli MIDC, Kolhapur

Date:- 20/09/2019

Roll No.	Name of Student	Sign	Roll No.	Name of Student	Sign
SC 03	AJGAR AKASH PRASAD		SC 28	RONGE VIVEK DASHRATH	
SC 04	AUTADE YOGESH SAMRUT		SC 29	SADUL SUNIL AMBADAS	
SC 06	BHANDARE PRANAV MILIND		SC 30	SHAIKH MD AAZAM EJAZ AHMED	
SC 07	DHABADE AVINASH BASAVRAJ		SC 31	SHIKALGAR SOHEL HUMAYUN	
SC 09	EAKAMALLI NITIN TATYA		SC 32	SOMADALE PRAVIN DILIP	
SC 10	GAIKWAD SAURABH SHAHAJI		SC 33	THORAT SHASHIKANT DADARAO	
SC 11	GANGTHADE VISHAL ANKUSH		SC 36	WAYKAR VALLABH TRIMBAK	
SC 12	JADHAV SUSHANT BHAUSAHEB		SC 37	PATIL OMKAR SANJAY	
SC 13	JAGTAP OMKAR CHANDRAKANT				
SC 14	KOLI AKASH REVAPPA				
SC 15	LAVATE DASHRATH PANDURANG				
SC 16	LONDHE AVINASH SANDIPAN				
SC 17	MANE AKASH SAMBHAJI				
SC 18	MANE-DESHMUKH SAMARTH BABRUVAHAN				
SC 19	MOHAMMAD SAJID KHAN				
SC 20	MUJAWAR NIHAL YUSUF				
SC 21	MULANI IRFAN RASHID				
SC 22	MUSALE PRAJWAL DATTATRAYA				
SC 23	NAGARGOJE RAMBHAJEE RAMCHANDRA				
SC 24	PADAGE PRITAM BALAJI				
SC 25	PARAS MAHAVIR MULE				
SC 26	PAWAR SHAILESH MAHADEV				

(Prof. P. K. Patil)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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DEPARTMENT OF MECHANICAL ENGINEERING

A.Y. 2019-20

CLASS: S. Y. B. Tech. (MECH) DIV: A

Attendance for Industrial Visit to Kedar Foundry, Palus Date:- 19/09/2019

	Name of Student	Sign	Roll No.	Name of Student	Sign
03	AJGAR AKASH PRASAD		SC 28	RONGE VIVEK DASHRATH	
04	AUTADE YOGESH SAMRUT		SC 29	SADUL SUNIL AMBADAS	
06	BHANDARE PRANAV MILIND		SC 30	SHAIKH MD AAZAM EJAZ AHMED	
07	DHABADE AVINASH BASAVRAJ		SC 31	SHIKALGAR SOHEL HUMAYUN	
09	EAKAMALLI NITIN TATYA		SC 32	SOMADALE PRAVIN DILIP	
10	GAIKWAD SAURABH SHAHAJI		SC 33	THORAT SHASHIKANT DADARAO	
11	GANGTHADE VISHAL ANKUSH		SC 36	WAYKAR VALLABH TRIMBAK	
12	JADHAV SUSHANT BHAUSAHEB		SC 37	PATIL OMKAR SANJAY	
13	JAGTAP OMKAR CHANDRAKANT				
14	KOLI AKASH REVAPPA				
15	LAVATE DASHRATH PANDURANG				
16	LONDHE AVINASH SANDIPAN				
17	MANE AKASH SAMBHAJI				
18	MANE-DESHMUKH SAMARTH BABRUVAHAN				
C 19	MOHAMMAD SAJID KHAN				
C 20	MUJAWAR NIHAL YUSUF				
C 21	MULANI IRFAN RASHID				
22	MUSALE PRAJWAL DATTATRAYA				
SC 23	NAGARGOJE RAMBHAJEE RAMCHANDRA				
SC 24	PADAGE PRITAM BALAJI				
SC 25	PARAS MAHAVIR MULE				
SC 26	PAWAR SHAILESH MAHADEV				

(Prof. P. K. Patil)
Class Coordinator

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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Industrial Visit Report

Date:- 10/03/2020

To,

The Principal

SVERI'S COEP

Pandharpur

Subject:- Report of Industrial Visit

Respected Sir,

As per the curriculum laid by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for S.Y B. Tech (Mechanical Engineering Part-II), Manufacturing Technology subject has included industrial visit. In this regard,125 student along with 8 faculty members visited S.G. Gear Tembhurni, on 3rd and 5th March. 2020. During Visit we had seen various types of gears, manufacturing of gears. From this industrial visit student got practical knowledge about actual gear manufacturing and they got satisfied with the visit

This is for your kind information and needful action.

Thanking you.

(Prof. K.S. Pukale)

MT Subject Teacher

S.Y. B. Tech (Mech) Div:- A and B

123 Students alongwith 8 faculty members visited to Industry

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Industrial Visit Report

Date:- 10/03/2020

To,

The Principal

SVERI'S COEP

Pandharpur

Subject:- Report of Industrial Visit

Respected Sir,

As per the curriculum laid by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for S.Y B. Tech (Mechanical Engineering Part-II), Power Plant and Energy Engineering subject has included industrial visit. In this regard,125 student along with 8 faculty members visited NPCIL Tarapur, on 3rdth, 4th and 5th March 2020. During Visit we had seen various power generation process. From this industrial visit student got knowledge about actual Power plant working process and they got satisfied with the visit

This is for your kind information and needful action.

Thanking you.

(Prof. Y. M. Khedkar)
PP and EE Subject Teacher
S.Y. B. Tech (Mech) Div:- A

(Prof. R. D. Solage)
PP and EE Subject Teacher
S.Y. B. Tech (Mech) Div:- B

123 Student alongwith 8 faculty members visited to Industry

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COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: II
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 28/02/2020

We undersigned students of S. Y. B. Tech Mech. (A) div. are hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to S. G. Gears Tembhurni, Atomic Power Station Tarapur and Samundra Maritine Studies Lonavala from 3rd March to 5th March 2020. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.

We are signing the undertaking on 28/02/2020 in presence of Prof. S. M. Kale, Prof. K. S. Pukale, Prof. R. D. Solage, Prof. Y. M. Khedkar.

Sr. No.	Name of Student	Sign	Sr. No.	Name of Student	Sign
1	/Achugatla Komal		36	Jatkar Prathamesh Manohar	
2	/Gajakosh Shradhha Dattatray		37	Joshi Atharv Santosh	
3	/Joshi Gayatri Vinayak		38	Kadasare Saurabh Bandu	
4	/Lakheri Vaishnavi Mahesh		39	Kale Ayush Nitin	
5	/Mirjkar Saleha Salim		40	Khandagale Rohit Ananda	
6	/Parchandarao Madhuri Vinayak		41	Kirgat Prathmesh Ramesh	
7	/Parvat Namrata Raju		42	Kshirsagar Sachin Ashok	
8	/Sathe Deepjyoti Dattatray		43	Pansare Akshay Balasaheb	
9	/Tarapurkar Rutuja Suresh		44	Misal Mangesh Mahavir	
10	Admane Dhananjay Rajendra		45	More Suraj Dattatray	
11	Sul Amol Dhondiba		46	Motewar Aditya Vyankatesh	
12	Bansode Dnyaneshwar Rohidas		47	Mundhe Nikhil Dilip	
13	Jadhav Atish Balaso		48	Narute Bhushan Narayan	
14	Burungale Bharat Dnyandev		49	Waghmare Sachin Dattatray	
15	Chavan Samarth Suresh		50	Disale Pranay	
16	Chavan Saurabh Chandrakant		51	Mane-Deshmukh Samarth	
17	Chavan Shreeyash Rajaram		52	Khan Mohammad Sajid	
18	Chavan Yogesh Prakash		53	Mujawar Nihal Yusuf	
19	Chavare Sumeet Suhas		54	Mulani Irfan Rashid	
20	Chitari Ghanasham Shashikant		55	Musale Prajwal Dattatraya	
21	Dandage Omkar Babaso		56	Nagargoje Rambhajee R	
22	Deokar Onkar Rajendra		57	Padage Pritam Balaji	
23	Deshmukh Pruthviraj Somnath		58	Mule Paras Mahavir	
24	Todkar Ganesh Shankar — Ab	—	59	Pawar Shailesh Mahadev	
25	Gadekar Yash Yuvraj		60	Phalake Onkar Haridas	
26	Gaikwad Vaibhav Nanasaheb		61	Ronge Vivek Dashrath	
27	Gaikwad Vaibhav Ramdas		62	Sadul Sunil Ambadas	
28	Ghadage Prakash Bhimrao		63	Md Aazam Ejaz Ahmed	
29	Shelar Yuvraj Vinod — Ab	—	64	Shikalgar Sohel Humayun	
30	Satapute Rahul Rajaram		65	Somadale Pravin Dilip	
31	Godse Rutik Ramesh		66	Thorat Shashikant Dadarao	
32	Patil Rushikesh Vidyadhar		67	Vairagkar Kanhaiya	
33	Hambirrao Kiran Vinayak		68	Wadekar Chaitanya —	Ab —
34	Jagadale Milind Shashikant		69	Waykar Vallabh Trimbak	
35	Parchandrao Chandragupt Vinayak		70	Patil Omkar Sanjay	

(Prof. S. M. Kale)
CC- S.Y. B. Tech (A)

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

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SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y.: 2019-20 SEM: II
UNDERTAKING FOR INDUSTRIAL VISIT

Date: 28/02/2020

We undersigned students of SE Mech. (B) div. are hereby declare that to fulfill the requirement of our university syllabus, we are willingly going to industrial visit to Tembhurni on 5th March 2020. We shall follow all the instructions given by staff members and maintain discipline & culture of institute throughout the visit. We are responsible for our own safety. If any misbehavior will happen from our side during visit, we are ready for punishment decided by authority.
We are signing the undertaking on 29/02/2020 in presence of Prof.R.D.Solage, Prof. K. S. Pukale, Prof. S. M. Kale, Prof. S. Y. Salunkhe, /Prof. P. K. Patil , /prof. H.M.Gove.

Sr. no.	Name of Student	Sign	Sr.no.	Name of Student	Sign
01	/Deshpande Samruddhi Rajendra		36	Shaikh Aftab Bashir	
02	/Ekatpure Prerana Shrirang		37	Shinde Dipak Pandurang	
03	/Lale Arati Gajanan		38	Shinde Nanasaheb Siddheshwar	
04	/Mane Snehal Digambar		39	ShindeVishwajit Ashok	
05	/More Vaishali Dilip		40	Shitole Dnyaneshawr Ganpat	
06	/Sonawane Dhanashree Bharat		41	Ubale Harshvardhan Sudhir	
07	Bansode Aniket Annasaheb		42	Taur Mohit Nagesh	
08	BapatVinayak Vishnu		43	Kengar SachinUttam	
09	Bhosale Hritik Ramesh		44	Langote Krishna Suryakant	
10	BhosaleVaibhav Rajendra		45	Vidhate Rohit Dattatraya	
11	Deshmukh Pratik Pravin		46	Wadekar Saurabh Ganesh	
12	Dixit Manthan Milind		47	Ajgar Akash prasad	
13	Gaikwad Abhinay Rajendra		48	Autade Yogesh Somnat	Ab
14	Gavali Suraj Rajendra		49	Bagul Sandip Bhagwan	Ab
15	Waghmode Chetan	Ab	50	Bhandare pranav milind	
16	Waghmode Dhondiram Madhu		51	Dhabade Avinash B.	
17	Khote Abhijeet Sunil		52	Dhere Rupesh A.	Ab
18	Kulkarni Atharv Makarand		53	Fakmalli Nitin Tatya	
19	Londhe Vaibhav Anil	Ab	54	Gaikwad saurabh S.	
20	Madane Avinash Ajinath	Ab	55	Gangthade Vishal Ankush	
21	Mali Amol Vijay		56	Jadhav Suhant	
22	Mashalkar Omkar Basavraj		57	Jagtap Omkar chandrakant	
23	Mulani Aman Allauddin		58	Koli Akash Revappa.	
24	Nagtilak Harshal Rajendra		59	Lavate Dashrath	
25	Nanaware Jaydev Dipak		60	Londhe Avinash sandipan	
26	Patil Madan Kalyan		61	Mane Akash sandipan	
27	Patil Santosh Hanamant		62	Kadam Nilesh Sanjay	
28	Patil Yogesh Kumar				
29	Pawar Omkar Santosh				
30	Pawar ShubhamUttam				
31	Rai Hrishav Raj				
32	Rohit Dattatry Chatage				
33	Yasar Yusuf Khatik				
34	Sarak Kashiling Kalidas				
35	Saravale Aniket Rajkumar				

(Prof. R.D. Solage)
Class Coordinator

(Prof. S.A.Sonawane)
Head, Mech. Engg. Dept.

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S. G. GEARS

TÜV AUSTRIA CERTIFIED EN ISO 9001

MFG. OF : GEAR, GEAR BOXES & PRECISION MACHINED COMPONENTS

HEAD OFFICE : PLOT NO. 35, SECTOR 10, PCNTDA IND. AREA, BEHIND TIMES OF INDIA, BHOSARI, PUNE - 411 026. ☎: 020-66301152
E-mail : sggears@gmail.com Web. : www.sggears.co.in

WORKS : PLOT NO. B-10/1/1, M.I.D.C., TEMBHURNI, TAL. MADHA, DIST. : SOLAPUR - 413 211.

Date :- 05/03/2020

To ,

The Principal ,

SVERI's College of Engineering ,

Pandharpur .

Sub :- About Industrial Visit ...

Respected Sir ,

With respect to above cited subject your around 140 students for S.Y.B. Tech along with 8 faculty members visited our organization as a part of industrial visit on 3rd March 2020 and 5th March 2020 related to manufacturing Technology subject of mechanical engineering . During this visit to your student were found sincere and studious . The student got practical exposure of gear manufacturing processes . We express best wishes to your institute and all students . Visit again ..

Thanking You

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SVERI

Ram Solage <rdsolage@coe.sveri.ac.in>

: Request for Industrial Visit at Your Institute

sage

injay Kumbhar <dakumbhar@coe.sveri.ac.in> Sun, Mar 1, 2020 at 1:00 PM
. Sachin Kale" <smkale@coe.sveri.ac.in>, rdsolage@coe.sveri.ac.in, kspukale@coe.sveri.ac.in

---- Forwarded message ---------
: simsmumbai <simsmumbai@samundra.com>
: Fri, Feb 28, 2020, 13:08
ject: RE: Request for Industrial Visit at Your Institute
hananjay Kumbhar <dakumbhar@coe.sveri.ac.in>

Sir,

tings Of The Day

riting in response to your mail after discussion. I'm delighted to accept your request to come down to for the field visit. We believe this to be an another significant step in bringing awareness about the r opportunity with SAMUNDRA INSTITUTE OF MARITIME STUDIES and relate to the training provided s importance to turn the Mechanical Engineers in to Marine Engineers.

ok forward to see your candidate and faculty as on 4th & 5th Of march.

s & Regards

fficer Representative of the Zone:

Raymond Swamy

Personnel Officer)

Samundra Institute of Maritime Studies
Gat. No. 158/159 Mumbai-Pune Highway
Village - Takve Khurd, Tal- Maval,
Lonavala - 410 405, Dist - Pune
Phone No. 02114 399500

ndra Institute of Maritime Studies

Takwe-Khurd, Mumbai-Pune Highway(NH4),

ila, Dist. Pune, Maharashtra, PIN- 410 405

+91 2114-399500

e No: +91 8408920869

91 2114-399600

simsmumbai@samundra.com

: www.samundra.com

hananjay Kumbhar [mailto:dakumbhar@coe.sveri.ac.in]
February 2020 11:20
umbai <simsmumbai@samundra.com>
Request for Industrial Visit at Your Institute

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h reference to our telephonic conversation, I would like to request you to give permission to our Final Year Mechanical]ineering Students for visit to your Institute on 4th March 2020 and 5th March 2020.

e of Visit: 4th March 2020

of Students: 90

of faculties accompany: 5

ıe of faculty coordinators: Prof. S M Kale - 9960118580

Prof. K S Pukale - 7776070913

of Visit: 5th March 2020

f Students: 45

f ılties accompany: 3

: of faculty coordinators: Prof. R D Solage - 9766990274

Prof. S Y Salunkhe - 8830976927

find attached request letter from Mechanical Engineering Department. Please consider our request and revert back to ıil.

ng you,

ırds,

hananjay A Kumbhar

Professor & TPO

!ls COE, Pandharpur

767107291

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SVERI

SVERI's College of Engineering Pandharpur <coe@sveri.ac.in>

›NFIRMATION OF VISIT REG. TAPS FIRST WEEK MARCH, 2020

essage

actms@npcil.co.in <pawactms@npcil.co.in>
HARISHAV RAI <hrishavrrai@coep.sveri.ac.in>
SVERI_PANDHARPUR_1 <coe@sveri.ac.in>

Fri, Feb 21, 2020 at 4:07 PM

spected Madam/Sir,

e Competent Authority has approved the visit.

it Of College Of Engineering, Phandharpur - 413304
tri Solapur (Maharashtra)

t As on 3,4,5,March,2020

al = 145 Visitors Including Student & Teachers

e:- Please carry originals College ID & Adhar Card while interring
urity chekpost Students & Teachers also required college id Xerox
otocopy)

se sent every day wise students& teachers list like 3,4,5,March,2020

Email through Visit Co- Ordinator Email, Mobiles, any phone no for
er communication

ards
SR CELL, TMS
ne No.02525 /244175
t 02525/283060
20

Above persons visited TAPS 3&4 under my guidance, thanks for co-operation -

Krishna Saravade
SAIF(QA)
9673117020

adiation exposure to public from NPP is negligible **

aimer
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9423489717

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K

College of Engineering
Pandharpur
1334

To [illegible] mechanical, KJ Solage

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)
Tel.: 02186-216061, 9503103757, Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in, Web: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accredited Institute, Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune, ISO 9001-2015 Certified Institute

Ref No: COEPR/2019-20/ 269

Date: 27/02/2020

To,

The Director,

S.G. Gear Pvt.Ltd,

MIDC Tembhurni.

Sub: -About Industrial Visit

Dear Sir,

Hope this letter finds you in good health and pleasant mood.

First of all, we wish to put forth few words regarding our College. Ours is NBA accredited and an ISO 9001:2008 certified Engineering College located in Pandharpur, the "South Kashi" of India and "Spiritual capital" of Maharashtra. "Shri Vitthal Education & Research Institute", Pandharpur, the trust established by group of qualified and experienced Technocrats. We offer the following four-year degree courses in engineering viz. Mechanical Engg., Civil Engg., Electronics & Tele communication Engg. and Computer Science & Engg.

As per our S.Y B. Tech. (Mechanical Engg.) syllabus for Manufacturing Technology, we want to organize industrial visit to your well reputed Gear Industry for getting knowledge about Gear. Our Second year Mechanical students are nearly about 140, who are willing to visit to your estimated organization. So you are requested to permit us to visit your esteemed organization for our S.Y. Mechanical students along with few Staff members, probably in the period of 03/03/2020 to 05/03/2020.

We will remain grateful to you, if we get a chance to visit your well reputed Gear Manufacturing industry.

Thanking you.

Visited
03-03-2020

S.G. GEARS SOLAPUR Tembhurni 413211

Yours faithfully,

SAS

(Dr. S.A. Sonawane)
Head, Mech, Dept.

HEAD,
Dept. of Mechanical Engg
C.O.E. Pandharpur,

On Dated 28/02/2020
I have discussed with
S.G. gear. Director. Dilip
SIR Reyanaly permission
he has given permission for
Industrial visit. on date
3/03/2020 & 5/03/2020
this is your kind information.
1/03/2020

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S.G.GEARS
An ISO 9001 : 2008 Company

SVERI's
College of Engineering, Pandharpur
Mechanical Engineering Department

Subject: Mechanical Workshop-I

Class: S.Y. B.Tech. (Mech.)

A.Y.: 2019-2020

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 (Sem-II)
CLASS: S. E. (MECH) DIV: A
List of Students undertaking Mechanical Workshop Practice-I

Roll No.	Name of Student	Roll No.	Name of Student
SA 01	/Achugatla Komal	SA 36	Jatkar Prathamesh Manohar
SA 02	/Gajakosh Shraddha Dattatray	SA 37	Joshi Atharv Santosh
SA 03	/Joshi GayatriVinayak	SA 38	Kadasare Saurabh Bandu
SA 04	/LakheriVaishnavi Mahesh	SA 39	Kale Ayush Nitin
SA 05	/MirjkarSaleha Salim	SA 40	Khandagale Rohit Ananda
SA06	/ParchandraoMadhuriVinayak	SA 41	Kirgat Prathmesh Ramesh
SA 07	/ParvatNamrata Raju	SA 42	Kshirsagar Sachin Ashok
SA 08	/Sathe Deepjyoti Dattatray	SA 43	Pansare Akshay Balasaheb
SA 09	/Tarapurkar Rutuja Suresh	SA 44	Misal Mangesh Mahavir
SA 10	Admane Dhananjay Rajendra	SA 45	More Suraj Dattatray
SA 11	Sul Amol Dhondiba	SA 46	Motewar Aditya Vyankatesh
SA 12	Bansode Dnyaneshwar	SA 47	Mundhe Nikhil Dilip
SA 13	Jadhav Atish Balaso	SA48	Narute Bhushan Narayan
SA 14	Burungale Bharat Dnyandev	SA49	Waghmare Sachin Dattatray
SA 15	Chavan Samarth Suresh	SA50	Disale Pranay
SA 16	Chavan Saurabh Chandrakant	SA51	Mane-Deshmukh
SA 17	Chavan Shreeyash Rajaram	SA52	Mohammad Sajid Khan
SA 18	Chavan Yogesh Prakash	SA53	Mujawar Nihal Yusuf
SA 19	Chavare Sumeet Suhas	SA54	Mulani Irfan Rashid
SA 20	Chitari Ghanasham	SA55	Musale Prajwal Dattatraya
SA 21	Dandage Omkar Babaso	SA56	Nagargoje Rambhajee
SA 22	Deokar Onkar Rajendra	SA57	Padage Pritam Balaji
SA 23	Deshmukh Pruthviraj	SA58	Paras Mahavir Mule
SA 24	Todkar Ganesh Shankar	SA59	Pawar Shailesh Mahadev
SA 25	GadekarYashYuvraj	SA60	Phalake Onkar Haridas
SA 26	Gaikwad VaibhavNanasaheb	SA61	Ronge Vivek Dashrath
SA 27	Gaikwad VaibhavRamdas	SA62	Sadul Sunil Ambadas
SA 28	Ghadage Prakash Bhimrao	SA63	Shaikh MdAazamEjaz
SA 29	ShelarYuvraj Vinod	SA64	Shikalgar Sohel Humayun
SA 30	Satapute Rahul Rajaram	SA65	Somadale Pravin Dilip
SA 31	Godse Rutik Ramesh	SA66	Thorat Shashikant Dadarao
SA 32	Patil RushikeshVidyadhar	SA67	Vairagkar Kanhaiya
SA 33	Hambirrao Kiran Vinayak	SA68	Wadekar Chaitanya Dattatray
SA 34	Jagadale Milind Shashikant	SA69	Waykar VallabhTrimbak
SA 35	Parchandrao Chandragupt V.	SA70	Patil Omkar Sanjay

(Prof. S. M. Kale)
Class Coordinator

(Prof. B. D. Gaikwad)
Workshop Incharge

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 (Sem-II)
CLASS: S. E. (MECH) DIV: B
List of Students undertaking Mechanical Workshop Practice-I

Roll No.	Name of Student	Roll No.	Name of Student
SB 01	/Deshpande Samruddhi Rajendra	SB 36	Patil Yogesh Kumar
SB 02	/Ekatpure Prerana Shrirang	SB 37	Pawar Omkar Santosh
SB 03	/Lale Arati Gajanan	SB 38	Pawar ShubhamUttam
SB 04	/Mane Snehal Digambar	SB 39	Rai Hrishav Raj
SB 05	/More Vaishali Dilip	SB 40	Rohit Dattatry Chatage
SB 06	/Sonawane Dhanashree Bharat	SB 41	Yasar Yusuf Khatik
SB 07	/Sarwade Karuna Sunil	SB 42	Sarak Kashiling Kalidas
SB 08	/Surve Prajakta Dharmraj	SB 43	Saravale Aniket Rajkumar
SB 09	Bankar Adesh Gorakh	SB 44	Shaikh Aftab Bashir
SB 10	Bansode Aniket Annaso	SB 45	Shaikh Salim Husen
SB 11	BapatVinayak Vishnu	SB 46	Shinde Dipak Pandurang
SB 12	Bhosale Hritik Ramesh	SB 47	Shinde Nanasaheb
SB 13	BhosaleVaibhav Rajendra	SB 48	ShindeVishwajit Ashok
SB 14	Deshmukh Pratik Pravin	SB 49	Shitole Dnyaneshawr
SB 15	Dhotre Sourabh Sanjay	SB50	Ubale HarshvardhanSudhir
SB 16	Dixit Manthan Milind	SB51	Taur Mohit Nagesh
SB 17	Gaikwad Abhinay Rajendra	SB52	Kengar SachinUttam
SB 18	Gavali Suraj Rajendra	SB 53	Langote Krishna S.
SB 19	Waghmode Chetan Machchhindra	SB54	Vidhate Rohit Dattatraya
SB 20	Waghmode Dhondiram Madhu	SB55	Wadekar Saurabh Ganesh
SB 21	Kadam Nilesh Sanjay	SB56	Ajgar Akash Prasad
SB 22	Khote Abhijeet Sunil	SB 57	Autade Yogesh Samrut
SB 23	Kulkarni Atharv Makarand	SB58	Bagul Sandip Bhagwan
SB 24	LondheVaibhav Anil	SB59	Bhandare Pranav Milind
SB 25	Madane Avinash Ajinath	SB60	Dhabade Avinash Basavraj
SB 26	Mali Amol Vijay	SB 61	Dhere Rupesh Ambrushi
SB 27	Mashalkar Omkar Basavraj	SB62	Eakamalli Nitin Tatya
SB 28	Metkari Om Damodar	SB63	Gaikwad Saurabh Shahaji
SB 29	Mulani Aman Allauddin	SB64	Gangthade Vishal Ankush
SB 30	Nagtilak Harshal Rajendra	SB 65	Jadhav Sushant Bhausaheb
SB 31	Nanaware Jaydev Dipak	SB66	Jagtap Omkar Chandrakant
SB 32	Nikam Saurabh Sanjay	SB67	Koli Akash Revappa
SB 33	Parmar Ridham Girish	SB68	Lavate Dashrath Pandurang
SB 34	Patil Madan Kalyan	SB 69	Londhe Avinash Sandipan
SB 35	Patil Santosh Hanamant	SB70	Mane Akash Sambhaji

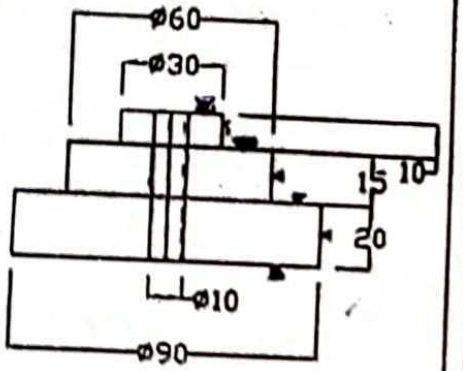
(Prof. R. D. Solage)
Class Coordinator

(Prof. B. D. Gaikwad)
Workshop Incharge

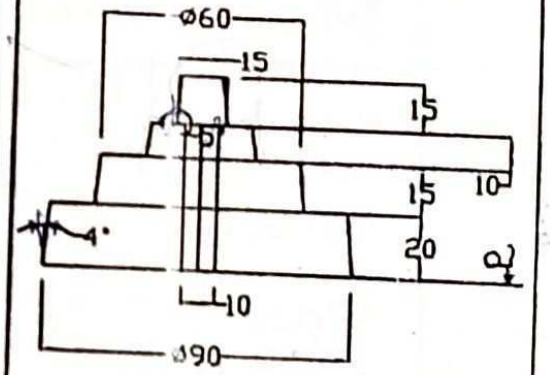
(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

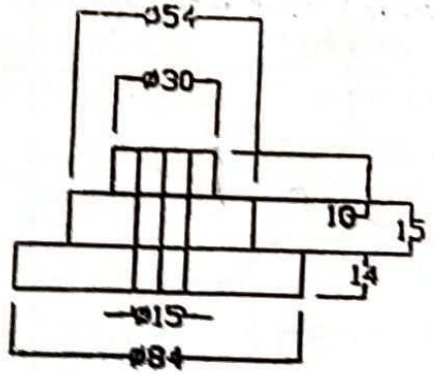
S.Y.B.Tech. (Mechanical Engineering) Pattern Making Job Drawing
Year - 2020-21

Casting Job Drawing



Pattern Job Drawing





Machined Casting Job Drawing

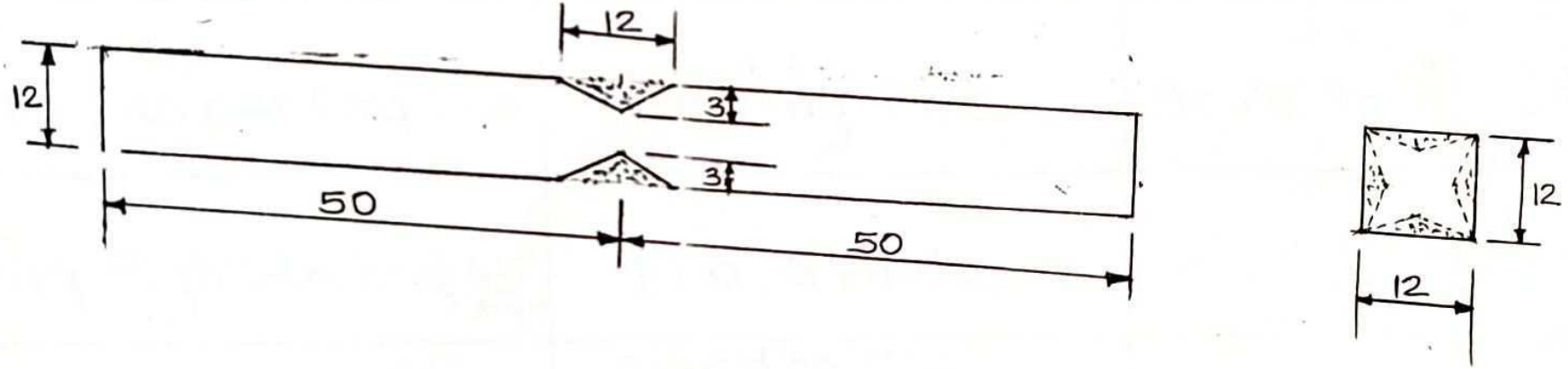
Raw Material - Teak Wood
Size - 100x100x50 mm - 1 No
Note - All Dimensions are in mm

S.Y.B.Tech. (Mech. Engineering)

Process Sheet (Pattern Making) Year - 2020-21.

T.No.	Description of Operation	Machine Used.	Job Holding Device.	Tool Used	Measuring Instrument Used	Cutting Parameters			Time in Min.
						Speed	Feed	Depth of Cut.	
1	Raw Material 100x100x50 mm Surface finish. (100x100 mm)	Hand Tools	Vice	Plane	Scale				
2	Marking on job Drg (centre)	Surface plate	Vice	Marker or Scriber.	Scale				
3	Holding on Four jaw chuck & Turning as per Dia.	Lathe	Four jaw chuck	Marking block.	Scale				
4	Facing L 45 mm.	Lathe	Four jaw chuck	Single point cutting tool. HSS.	Scale V/C				
5	Turning Ø30 L10 mm & 4° Taper (Draft) Turn.	Lathe	Four jaw chuck.	Single point cutting tool	Scale V/C				
6	Turning Ø60 L15 mm 4° Taper (Draft) Turn	Lathe	Four jaw chuck	Single point cutting tool	Scale V/C				
7	Turning Ø70 x L20. 4° Draft. (Turn).	Lathe	Four jaw chuck	Single point cutting tool	Scale V/C				
8	Material 20x20x20 Turn. (Print) Ø15 x L15 . 5° (Draft)	Lathe.	Four jaw chuck	Single point cutting tool	Scale V/C.				
9	Ø15 x 15. 5° Print Fit on Ø30 as per Drg.	Hand Tool	Vice	Fevicol	Scale				
10	Finishing.	Lathe.	Three jaw Chuck.	Polish paper	—				
11	Colour as per Drg.	—	—	Brush.	—				

S.Y.B.Tech.(Mech.Engineering).
Welding Job Drawing. Year - 2020-21.



Raw Material :- M.S. Square Bar.

Size :- 50 × 12 × 12. (2 Nos)

Note :- All Dimensions are in mm.

S.Y.B. Tech. (Mech. Engineering).

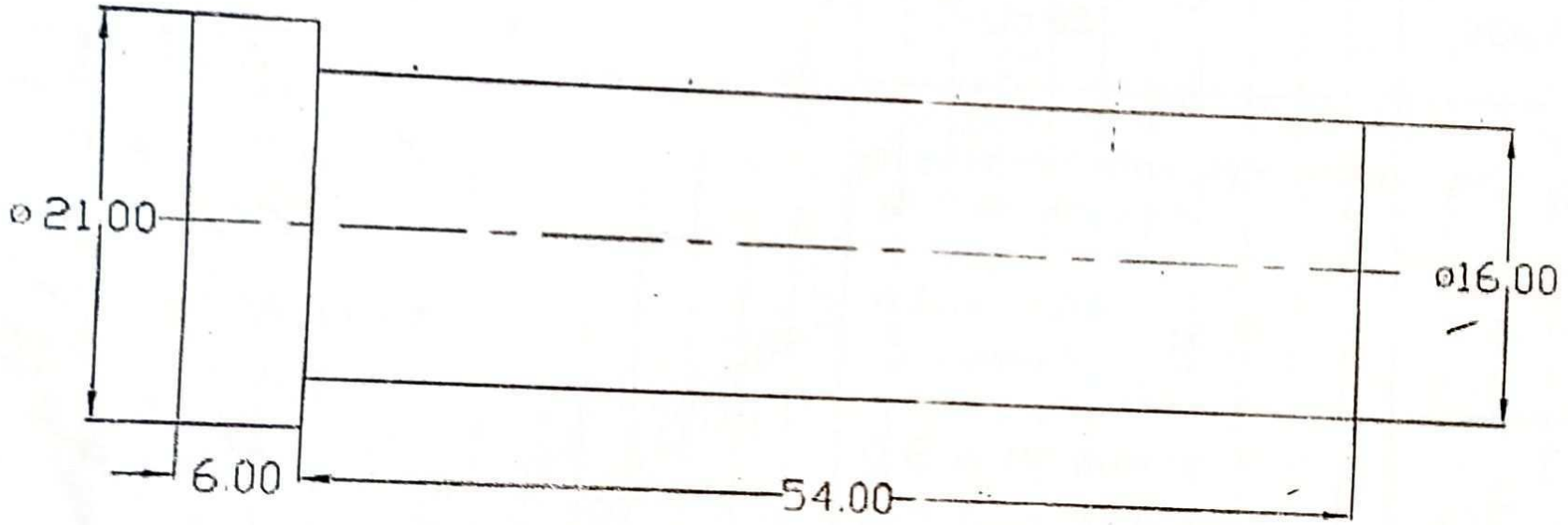
Process Sheet (Welding) Year-2020-21.

Sr. No.	Process.	Working Tools.	Measuring Tools.	Step.
1	Raw Material Marking	Scriber, Tape, Scale.	Scale, Tape.	01
2	Cutting as per Drg. Dim.	Cutting M/C.	Scale, Tape.	02
3	Filing Right Angle & 45° Angle	File, Grinder.	-	03
4	Welding as per. Drg.	1) Welding M/C. 2) 3.15mm. m.s. weld. Rod. 3) Screen. 4) Brush.	Right Angle. Tape	04
5	Finishing.	1) File. Grinder.	-	05

1	Selection of Current.	
2	Selection of Voltage.	
3	Polurity	
4	Type of joint	
5	Tensile Strength.	
6.	Selection of welding Rod.	

S.Y.B.Tech. (Mechanical Engineering) Forging Job Drawing

Year - 2020-21



Raw Material:- M.S.Bar
Size:- Ø16x64.33mm
Note:- All diamensions are in mm

S.Y.B.Tech. (Mech. Engineering) Process Sheet (Forging Job) Year-2020-21

Sr.No.	Process	Working Tools	Measuring Tool	Step SVER
	Marking	Scale.	Scale	01
2	Cutting	1) M.S Round Bar. 2) Hack Saw ϕ 15.87 x 64.7 mm L. M/C.	Scale.	02
3	Hitting	1) Furness 2) Tungs.	—	03
4	Forging	1) Big Hammer 2) Tungs 3) Anvil.	—	04
5	Finishing	Rough File.	—	05.
	Raw material Formula- $\frac{\pi}{4} \times (21)^2 \times 6 + \frac{\pi}{4}(16)^2 \times 64 = \frac{\pi}{4}(16)^2 \times L$. Volume = Volume.			

1	Type of Forging	Upset Forging.
2	Name of Component	Pin (Conveyor).
3	Material.	
4	Forging length calculation.	
5	Die Design. 1> Material. 2> Angular clearance. 3> ejector. 4> Furnace.	

SVERI's
College of Engineering, Pandharpur
Mechanical Engineering Department

Subject: Workshop Practice-IV

Class: T.E. (Mech.) Sem-I

A.Y.: 2019-2020

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 (Sem-I)
CLASS: T. E. (MECH) DIV: A
List of Students undertaking Mechanical Workshop Practice-IV

Roll No.	Name of Student	Roll No.	Name of Student
TA 01	/Bhumkar Manasi Dinesh	TA 39	Kale Rohan Suresh
TA 02	/Chavan Sonali Umesh	TA 40	Kale Shubham Malashidha
TA 03	/Ghogale Mansi Sanjay	TA 41	Kale Vaibhav Pandurang
TA 04	/Attar Muskan Mukthar	TA 42	Kambire Pankaj Popat
TA 05	/Mhetre Shubhada Shantanu	TA 43	Khadake Prajwal Sunil
TA 06	/Gavali Anjali Pandurang	TA 44	Khapale Siddheshwar g.
TA 07	/Gore Gauri Ramchandra	TA 45	Khyade Amit Rajendra
TA 08	/Kothawale Shivani Sanjay	TA 46	Kodag Vasudev Dattatray
TA 09	/Nikate Pornima Milind	TA 47	Koli Charandas Appaso
TA 10	Atre Shrirang Rajendra	TA 48	Kulkarni Chaitanya Laxmikant
TA 11	Autade Dashrath Madhukar	TA 49	Mane Mahesh Gunvant
TA 12	Bagwan Mudaser Mahebob	TA 50	Nagras Pranil Prakash
TA 13	Bandai Prathamesh M.	TA 51	Pandit Yogesh Dhananjay
TA 14	Bhise Akash Namdev	TA 52	Pangudwale Purvesh Prakash
TA 15	Chavan Suraj Baban	TA 53	Patil Ganesh Basavaraj
TA 16	Dandwate Rushikesh Prasad	TA 54	PatilAshutosh Sunil
TA 17	Deshmane Rushikesh Sanjay	TA 55	Pawar Aniket Santosh
TA 18	Devkate Sachin Kisan	TA 56	Pawar DayanandYogesh
TA 19	Devkate Yogeshwar Arvind	TA 57	Pawar Pruthviraj Deepak
TA 20	Dhumal Vikas Vitthal	TA 58	Rode Vaibhav Balasaheb
TA 21	Gahirwar Pawansing Kiransing	TA 59	Sapkal Nishklank Zumbar
TA 22	Gaikwad Suraj Tanaji	TA 60	Sathe Pradip Shivaji
TA 23	Gaikwad Swapnil Rajendra	TA 61	Sayyad Azam Akram
TA 24	Gandule Rohan Rajaram	TA 62	Shaikh Juned Ramjan
TA 25	Ganjale Ashish Namdev	TA 63	Sheikh VijasJaylani
TA 26	Gavali Parit Pavan Ankush	TA 64	Shejal Samadhan Nagnath
TA 27	Ghadage Vaibhav Prabhakar	TA 65	Shinde Rajkumar Nana
TA 28	Ghadge Onkar Dhananjay	TA 66	Shinde Saurabh Mahadev
TA 29	Gore Omkar Rajkumar	TA 67	Sirsat Anna Yuvraj
TA 30	Gosavi Dada Prakash	TA 68	Sonar Sunil Ravindra
TA 31	Gund Omkar Shahaji	TA 69	Tadmare Swapnil Sanjaykumar
TA 32	Honkande Rohan Ramesh	TA 70	Vibhute Rushikesh Nandkumar
TA 33	Jadhav Ajinkya Arjun	TA 71	Wasnik Harshal Prakash
TA 34	Jadhav Rushikesh Kalyan	TA 72	Ghuge Hrushikesh Ravindra
TA 35	Mangrule Vedant D.	TA 73	Gavali Shubham Amol
TA 36	Jundale Rahul Rajkumar	TA74	Jadhav Vivek Sajjan
TA 37	Kadam Shubham Jaimilind	TA 75	Sathe Shubham Bhalchandra
TA 38	Kakade Shubham Madhukar		

(Prof. S. N. More)
Class Coordinator

(Prof. B. D. Gaikwad)
Workshop Incharge

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 (Sem-I)
CLASS: T. E. (MECH) DIV: B
List of Students undertaking Mechanical Workshop Practice-IV

Roll No.	Name of Student	Roll No.	Name of Student
TB 01	/Ashture Chandraprabha	TB 39	Tanage Prashant Sambhaji
TB 02	/Bhosale Pranoti Ramchandra	TB 40	Pavase Mayur Santosh
TB 03	/Deomare Nikita Narayan	TB 41	Pophale Pratap Ashok
TB 04	/Kambale Pooja Dilip	TB 42	Raut Shubham Anil
TB 05	/Nistane Shweta Shadashiv	TB 43	Raut Yogesh Dattatray
TB 06	Waghmode Pradyumna Dinesh	TB 44	Salgar Laxman Balaso
TB 07	Kolekar Vijay Mahadeo	TB 45	Salgar Ram Balaso
TB 08	Adalinge Rohit Chandrakant	TB 46	Tamboli Arbaj Jabbar
TB 09	Nagane Amol Mahadeo	TB 47	Sansare Sanket Manojkumar
TB 10	Chavan Dinesh Uttam	TB 48	Shinde Mahesh Vilas
TB 11	Dandage Vaibhav Nagnath	TB 49	Shelake Girish Dnyaneshwar
TB 12	Takale Akshay Angad	TB 50	Shaikh Nihal Naushad
TB 13	Dhage Shantanu Prakash	TB 51	Thakare Bhushankumar D.
TB 14	Vhankalas Avinash Bhaskar	TB 52	Shinde Abhijeet Ashok
TB 15	Ingale Pratik Vasantrao	TB 53	Shinde Abhishek Amar
TB 16	Sathe Akshay Sunil	TB 54	Tate Rutvik Bramhadev
TB 17	Jadhav Vaibhav Satish	TB 55	Waghmare Dipak Subhash
TB 18	Tuljapurkar Gaurav Jayant	TB 56	Shrigadi Swamisamarth V.
TB 19	Valsange Akash Somanath	TB 57	Telang Sanket Satish
TB 20	Kshirsagar Abhishek Prakash	TB 58	Bansode Shubham Dattatray
TB 21	Kumbhar Ganesh Naganath	TB 59	Bhosale Saurabh Namadev
TB 22	Kumbhar Pratikesh Pramod	TB 60	Bhadane Rahul Madhukar
TB 23	Lad Varad Anil	TB 61	Boramanikar Sanket
TB 24	Kale Raviraj Yuvaraj	TB 62	Chidrewar Ganesh Pandurang
TB 25	Langote Shubham Sambhaji	TB 63	Sapkal Ruturaj
TB 26	Magi Prasad Dattatray		
TB 27	Mandwale Pratiksinh S.		
TB 28	Jadhav Ruturaj Satish		
TB 29	Masal Samadhan Dadaso		
TB 30	Mulani Aftab Iqbal		
TB 31	Mulani Shahid Mahammad		
TB 32	Mulani Vasim Jahangir		
TB 33	Muthawat Kedar Sanjay		
TB 34	Thite Prem Ganesh		
TB 35	Nayaku Akshay Laxman		
TB 36	Nimgire Piyush Dadasaheb		
TB 37	Pandhare Rohan Anil		
TB 38	Parkam Pavan Shashikant		

(Prof. K. B. Jundale)
Class Coordinator

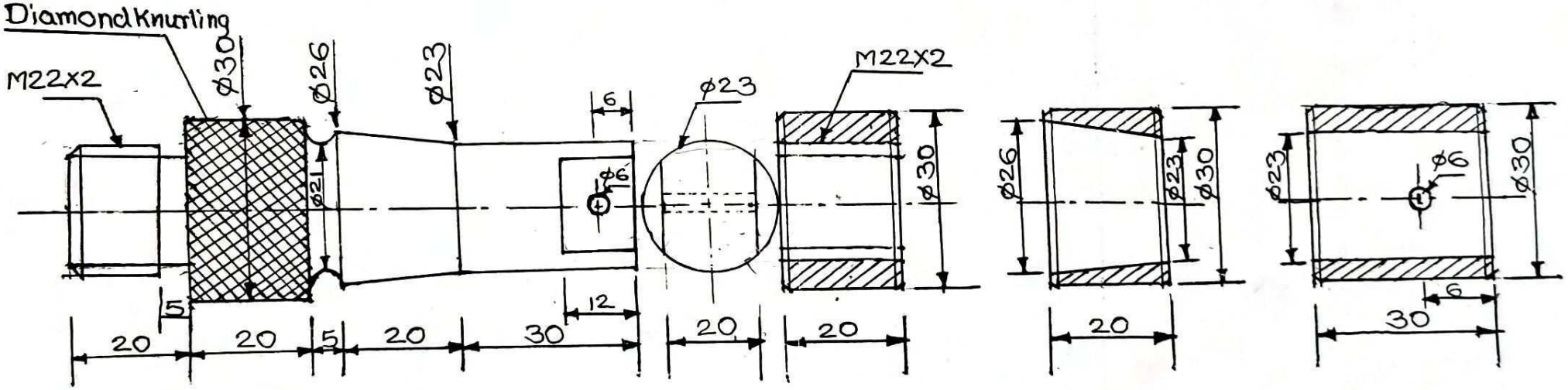
(Prof. B. D. Gaikwad)
Workshop Incharge

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

Job Drawing TE Mech Part-II

Work shop Practice IV&V Year - 2019-2021

Part-A Part-B Part-C Part-D.



Note: 1) All dimensions are in mm.
2) Remove sharp corners, chamfers 1x45°.
3) Fit Part - B, C, & D on Part - A.
4) Material :-

Part A : MS Polish Bar ø32 x 100 mm = 01 Nos
Part B : MS Polish Bar ø32 x 25 mm = 01 Nos
Part C : MS Polish Bar ø32 x 25 mm = 01 Nos
Part D : MS Polish Bar ø32 x 35 mm = 01 Nos.

T. E. Mechanical Engineering 2019-20

Workshop Practical – V

PROCESS SHEET

PART-A.

Sr. No	Description Of Operation	Machine Used	Job Holding Device	Tool Used	Measuring Instrument Used	Cutting Parameter			
						Speed	Feed	Depth Of Cut	Cycle Time
1	Raw material cutting (Ø32 mm)	Power Hexa	Vice	cutting blade	Steel rule & scale				
2	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
3	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
4	Step Turning (30 mm)	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
5	Taper Turning (20 mm)	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
6	Grooving (21 X 5 mm)	Lathe machine	3 Jaw chuck	Grooving tool	Vernier scale				
7	Champering (45°)	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale.				
8	Threading	Lathe machine	3 Jaw chuck	Threading tool	Threading gauge				
9	Grooving (R5)	Lathe machine	3 Jaw chuck	Grooving Tool	Vernier scale				
10	Knurling	Lathe machine	3 Jaw chuck	Diamond knurling	Vernier scale				
11	Drilling	Drilling machine	Vice	Drill bit	Vernier scale				
12	Saddle milling	Milling machine	3 Jaw chuck	Milling cutter	Vernier scale				
	PART B								
1	Raw material cutting	Power Hexa	Vice	cutting blade	Steel rule scale				

Practical Teacher: -

(Prof. B. D. Gaikwad)
Workshop Incharge

T. E. Mechanical Engineering 2019-20
Workshop Practical – V

PROCESS SHEET

Sr. No	Description Of Operation	Machine Used	Job Holding Device	Tool Used	Measuring Instrument Used	Cutting Parameter			
						Speed	Feed	Depth Of Cut	Cycle Time
2	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
3	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
4	Drilling	Lathe machine	3 Jaw chuck	Drill bit	Veenier Scale				
5	Tapping	Lathe machine	3 Jaw chuck	Tap Tool	Threading gauge				
	PART - C								
1	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
2	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
3	Drilling	Lathe machine	3 Jaw chuck	Drilling bit	Veenier Scale				
4	Taper boring	Lathe machine	3 Jaw chuck	Boring Tool	Veenier Scale				
	PART - D								
1	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
2	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
3	Drilling	Lathe machine	3 Jaw chuck	Drilling bit	Veenier Scale				
4	Boring (Straight)	Lathe machine	3 Jaw chuck	Boring Tool	Veenier Scale				

Practical Teacher: -

(Prof. B. D. Gaikwad)
Workshop Incharge

SVERI's
College of Engineering, Pandharpur
Mechanical Engineering Department

Subject: Workshop Practice-V

Class: T.E. (Mech.) Sem-II

A.Y.: 2019-2020

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 (Sem-II)
CLASS: T. E. (MECH) DIV: A

List of Students undertaking Mechanical Workshop Practice-V

Roll No.	Name of Student	Roll No.	Name of Student
TA 01	/Bhumkar Manasi Dinesh	TA 39	Kale Rohan Suresh
TA 02	/Chavan Sonali Umesh	TA 40	Kale Shubham Malashidha
TA 03	/Ghogale Mansi Sanjay	TA 41	Kale Vaibhav Pandurang
TA 04	/Attar Muskan Mukthar	TA 42	Kambire Pankaj Popat
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TA 06	/Gavali Anjali Pandurang	TA 44	Khapale Siddheshwar g.
TA 07	/Gore Gauri Ramchandra	TA 45	Khyade Amit Rajendra
TA 08	/Kothawale Shivani Sanjay	TA 46	Kodag Vasudev Dattatray
TA 09	/Nikate Pornima Milind	TA 47	Koli Charandas Appaso
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TA 19	Devkate Yogeshwar Arvind	TA 57	Pawar Pruthviraj Deepak
TA 20	Dhumal Vikas Vitthal	TA 58	Rode Vaibhav Balasaheb
TA 21	Gahirwar Pawansing Kiransing	TA 59	Sapkal Nishklank Zumbar
TA 22	Gaikwad Suraj Tanaji	TA 60	Sathe Pradip Shivaji
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TA 31	Gund Omkar Shahaji	TA 69	Tadmare Swapnil Sanjaykumar
TA 32	Honkande Rohan Ramesh	TA 70	Vibhute Rushikesh Nandkumar
TA 33	Jadhav Ajinkya Arjun	TA 71	Wasnik Harshal Prakash
TA 34	Jadhav Rushikesh Kalyan	TA 72	Ghuge Hrushikesh Ravindra
TA 35	Mangrule Vedant D.	TA 73	Gavali Shubham Amol
TA 36	Jundale Rahul Rajkumar	TA74	Jadhav Vivek Sajjan
TA 37	Kadam Shubhani Jaimilind		
TA 38	Kakade Shubham Madhukar		

(Prof. C. C. Jadhav)
Class Coordinator

(Prof. B. D. Gaikwad)
Workshop Incharge

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

SVERI's COLLEGE OF ENGINEERING PANDHARPUR
DEPARTMENT OF MECHANICAL ENGINEERING
A.Y. 2019-20 (Sem-II)
CLASS: T. E. (MECH) DIV: B
List of Students undertaking Mechanical Workshop Practice-V

Roll No.	Name of Student	Roll No.	Name of Student
TB 01	/Ashture Chandraprabha	TB 39	Tanage Prashant Sambhaji
TB 02	/Bhosale Pranoti	TB 40	Pavase Mayur Santosh
TB 03	/Deomare Nikita Narayan	TB 41	Pophale Pratap Ashok
TB 04	/Kambale Pooja Dilip	TB 42	Raut Shubham Anil
TB 05	/Nistane Shweta Shadashiv	TB 43	Raut Yogesh Dattatray
TB 06	Waghmode Pradyumna	TB 44	Salgar Laxman Balaso
TB 07	Kolekar Vijay Mahadeo	TB 45	Salgar Ram Balaso
TB 08	Adalinge Rohit Chandrakant	TB 46	Tamboli Arbaj Jabbar
TB 09	Nagane Amol Mahadeo	TB 47	Sansare Sanket Manojkumar
TB 10	Chavan Dinesh Uttam	TB 48	Shinde Mahesh Vilas
TB 11	Dandage Vaibhav Nagnath	TB 49	Shelake Girish Dnyaneshwar
TB 12	Takale Akshay Angad	TB 50	Shaikh Nihal Naushad
TB 13	Dhage Shantanu Prakash	TB 51	Thakare Bhushankumar D.
TB 14	Vhankalas Avinash Bhaskar	TB 52	Shinde Abhijeet Ashok
TB 15	Ingale Pratik Vasantrao	TB 53	Shinde Abhishek Amar
TB 16	Sathe Akshay Sunil	TB 54	Tate Rutvik Bramhadev
TB 17	Jadhav Vaibhav Satish .	TB 55	Waghmare Dipak Subhash
TB 18	Tuljapurkar Gaurav Jayant	TB 56	Shrigadi Swamisamarth V.
TB 19	Valsange Akash Somanath	TB 57	Telang Sanket Satish
TB 20	Kshirsagar Abhishek Prakash	TB 58	Bansode Shubham Dattatray
TB 21	Kumbhar Ganesh Naganath	TB 59	Bhosale Saurabh Namadev
TB 22	Kumbhar Pratikesh Pramod	TB 60	Bhadane Rahul Madhukar
TB 23	Lad Varad Anil	TB 61	Boramanikar Sanket
TB 24	Kale Raviraj Yuvaraj	TB 62	Chidrewar Ganesh
TB 25	Langote Shubham Sambhaji	TB 63	Sapkal Ruturaj
TB 26	Magi Prasad Dattatray		
TB 27	Mandwale Pratiksinh S.		
TB 28	Jadhav Ruturaj Satish		
TB 29	Masal Samadhan Dadaso		
TB 30	Mulani Aftab Iqbal		
TB 31	Mulani Shahid Mahammad		
TB 32	Mulani Vasim Jahangir		
TB 33	Muthawat Kedar Sanjay		
TB 34	Thite Prem Ganesh		
TB 35	Nayaku Akshay Laxman		
TB 36	Nimgire Piyush Dadasaheb		
TB 37	Pandhare Rohan Anil		
TB 38	Parkam Pavan Shashikant		

(Prof. D. D. Ronge)
Class Coordinator

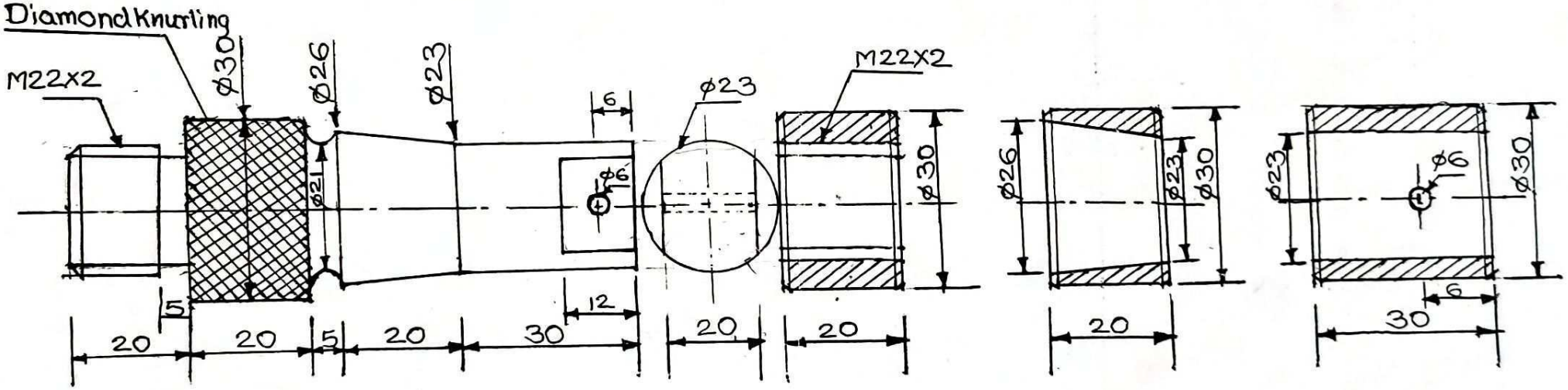
(Prof. B. D. Gaikwad)
Workshop Incharge

(Dr. S. A. Sonawane)
Head, Mech. Engg. Dept.

Job Drawing TE Mech Part-II

Work shop Practice IV&V Year - 2019-2021

Part-A Part-B Part-C Part-D.



Note: 1) All dimensions are in mm.
2) Remove sharp corners, chamfers 1x45°.
3) Fit Part - B, C, & D on Part - A.
4) Material :-

Part A : MS Polish Bar ø32 x 100 mm = 01 Nos
Part B : MS Polish Bar ø32 x 25 mm = 01 Nos
Part C : MS Polish Bar ø32 x 25 mm = 01 Nos
Part D : MS Polish Bar ø32 x 35 mm = 01 Nos.

T. E. Mechanical Engineering 2019-20

Workshop Practical – V

PROCESS SHEET

PART-A.

Sr. No	Description Of Operation	Machine Used	Job Holding Device	Tool Used	Measuring Instrument Used	Cutting Parameter			
						Speed	Feed	Depth Of Cut	Cycle Time
1	Raw material cutting (Ø32 mm)	Power Hexa	Vice	cutting blade	Steel rule & scale				
2	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
3	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
4	Step Turning (30 mm)	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
5	Taper Turning (20 mm)	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale				
6	Grooving (21 X 5 mm)	Lathe machine	3 Jaw chuck	Grooving tool	Vernier scale				
7	Champering (45°)	Lathe machine	3 Jaw chuck	Single pt cutting	Vernier scale.				
8	Threading	Lathe machine	3 Jaw chuck	Threading tool	Threading gauge				
9	Grooving (R5)	Lathe machine	3 Jaw chuck	Grooving Tool	Vernier scale				
10	Knurling	Lathe machine	3 Jaw chuck	Diamond knurling	Vernier scale				
11	Drilling	Drilling machine	Vice	Drill bit	Vernier scale				
12	Saddle milling	Milling machine	3 Jaw chuck	Milling cutter	Vernier scale				
	PART B								
1	Raw material cutting	Power Hexa	Vice	cutting blade	Steel rule scale				

Practical Teacher: -

(Prof. B. D. Gaikwad)
Workshop Incharge

T. E. Mechanical Engineering 2019-20
Workshop Practical – V

PROCESS SHEET

Sr. No	Description Of Operation	Machine Used	Job Holding Device	Tool Used	Measuring Instrument Used	Cutting Parameter			
						Speed	Feed	Depth Of Cut	Cycle Time
2	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
3	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
4	Drilling	Lathe machine	3 Jaw chuck	Drill bit	Veenier Scale				
5	Tapping	Lathe machine	3 Jaw chuck	Tap Tool	Threading gauge				
	PART - C								
1	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
2	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
3	Drilling	Lathe machine	3 Jaw chuck	Drilling bit	Veenier Scale				
4	Taper boring	Lathe machine	3 Jaw chuck	Boring Tool	Veenier Scale				
	PART - D								
1	Facing	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
2	Turning	Lathe machine	3 Jaw chuck	Single pt cutting	Veenier Scale				
3	Drilling	Lathe machine	3 Jaw chuck	Drilling bit	Veenier Scale				
4	Boring (Straight)	Lathe machine	3 Jaw chuck	Boring Tool	Veenier Scale				

Practical Teacher: -

(Prof. B. D. Gaikwad)
Workshop Incharge

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304. District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Computer Science & Engineering Programme Code: 1-1408968327			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Project Phase-I	CS417	146
2.	Vocational Training	CS418	
3.	Project Phase-II	CS426	
4.	Mini Project	CS327	137

PRINCIPAL,
College of Engineering
PANDHARPUR

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SVERI's
College of Engineering, Pandharpur

Computer Science & Engineering Department

Sponsored Project Record

A.Y.: 2019-2020

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Department of Computer Science and Engineering

Sponsored Projects List B.E. CSE 2019-20

Group No.	Name of Students	Project Titles	Name of Industry
1	Pradip Mali Jadhav Shrihari K Karankot Rohan S Kambale Rohit L Dolle Mahadev I	Car Rental Web Application	Mind IT Services,Miraj
2	Sayali Bhosale Jagalpure Mansi D Dhasade Shraddha S Shraddha Gaikwad	Fake News Analysis	Dacway Info, Solapur
3	Ardak Suraj S. Kalshetti Ajit P Kedare Vishal G Kalekar Aditya Gund Atul K	Smart Irrigation system using IOT	ADJ Infotech, Pvt.Ltd , Solapur
4	Pooja Vibhute Shivani D Soni Jyotsna Salunkhe Sneha Padwal	Smart Garbage Detection and Decomposition	Chaturdashi Enterprises & IT Services
5	Dhanaraj T Patil Vishal P Munguskar Mujamuil S Shaikh Mayur R Patil Pankaj A Shinde	Fingerprint Based Voting System	Dacway Info, Solapur
6	Tarannum N Tamboli Tabassum N Tamboli Pratiksha R Shindepatil Mayuri Z Surwase	Smart Farm	ADJ Infotech, Pvt.Ltd Solapur
7	Pradipta Mahimkar Srushti S Dhavale Madhura G Shinde Prajkta S Sugandhi	Detection of Fake Accounts with Machine Learning	Mind IT Services, Miraj

(Dr. P. G. Gaikwad)
Project Coordinator

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in. Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P. A. H. Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute

Department of Computer Science and Engineering
Sponsored Projects List B.E. CSE 2019-20

Group No.	Name of Students	Project Titles	Name of Industry
8	Kumbhar Kajal P Thakare Gayatri S Bhosale Priti Bhui Aparna Bhosale Pradnya	Lane detection using Artificial Intellegence.	Chaturdashi Enterprises & IT Services
9	Shubham S Shirur Siddhnath Bhandare Vinit Mhetre Pratap Madgundi Deshmukh A. G.	Skill encouragement website(InnerVoice)	Webtech DevelopersPvt.Ltd

(Mr. P.G. Gaikwad)
Project Coordinator

Head, CSE Dept.
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

Mind IT Services

True Minded People! Reliable Services!

Cell: +91-9270090011
Email: mail@mindItservices.in
Website: www.mindItservices.in

Govt. Colony, Opp. Datta Mandir
Miraj, 416 410
Dist. Sangli, Maharashtra

To,

HOD,

Computer Science & Engineering Department.

SVERI's College of Engineering,

Pandharpur.

Subject: -Letter of Appreciation for your final students.

Dear Sir,

We are happy to inform you that your following students have interacted our team and visited our sites at Mind IT Services at Miraj, Tal. Miraj Dist. Sangli for doing their final year project titled "Car Rental Web Application" during academic year 2019-20. The notable points of the projects are:

1. It is important for the team to have domain knowledge.
2. Teams that will challenge them through questioning ideas and offering their advice on the best way forward.
3. A software project team will have an extensive background in software development and significant IT domain knowledge.

Name of students:

1. Pradip Mali
2. Jadhav Shrihari K.
3. Karankot Rohan S
4. Kambale Rohit L
5. Dolle Mahadev I

Mind IT Services
www.mindItservices.in

Authorized Signature

Dacway

To,

HOD,

Computer Science & Engineering Department.

College of Engineering,

Pandharpur.

Subject: -Letter of Appreciation for your final students.

Dear Sir/Madam,

We are happy to inform you that your following students have interacted our team and visited our sites at DacwayInfo. Solapur for doing their final year project titled **"Fake News Analysis"** during academic year 2019-20. The notable points of the projects are:

1. It is important for the team to have domain knowledge.
2. Teams that will challenge them through questioning ideas and offering their advice on the best way forward.
3. A software project team will have an extensive background in software development and significant IT domain knowledge.

Name of students:

1. Sayali Bhosale
2. Jagalpure Mansi D
3. Dhasade Shraddha S
4. Shraddha Gaikwad

Dacway Solapur Think. To Start

DACWAY INFOTECH

ADJ Infotech

22, Veershaiv Nagar,Jule Solapur, Solapur. Cell Number: +919511906919
www.adjinfotech.com Email : onkar@adjinfotech.com

To,

HOD,

Computer Science & Engineering Department.

College of Engineering,

Pandharpur.

Subject: -Letter of Appreciation for your final students.

Dear Sir/Madam,

We are happy to inform you that your following students have interacted our team and visited our sites at ADJ InfoTech, Pvt. Ltd. Solapur for doing their final year project titled **"Smart Irrigation system using IOT"** during academic year 2019-20. The notable points of the projects are:

4. It is important for the team to have domain knowledge.
5. Teams that will challenge them through questioning ideas and offering their advice on the best way forward.
6. A software project team will have an extensive background in software development and significant IT domain knowledge.

Name of students:

1. Ardak Suraj S.
2. Kalshetti Ajit P.
3. Kedare Vishal G.
4. Kalekar Aditya

A.D.J. Infotech Services Pvt. Ltd. * Solapur *

कर्मण्येवाधिकारस्ते मा फलेषु कदाचन । मा कर्मफलहेतुर्भूर्मा ते संगोऽस्त्वकर्मणि ॥

CHATURDASHI ENTERPRISES & IT SERVICES

Vilasrao Shinde Shopping Center, Plot No. 16, Main Road Ashta
Tal-Walwa, Dist-Sangli Pin-416301 UAM No. : MH32D0035615
Contact No.: 8600477947 / 9403985975/76 Email:-ssvs25815@gmail.com.

Ref. No.

Date :- 27/02/2019

To whomsoever it may concern

This is to certify that students of Computer Science and Engineering Department from **SVERI's College of Engineering Pandharpur** are allowed to develop software module for our Company under title of **"Smart Garbage Detection and Decomposition."**

The details of operation will be provided as per requirements.

The students are as follows

1. **Ms. Pooja Vibhute**
2. **Ms. Shivani D. Soni**
3. **Ms. Jyotsna Salunkhe**
4. **Ms. Sneha Padwal**

CHATURDASHI ENTERPRISES & IT SERVICES UAM No. MH32D0035615

Authorized Signature

Dacway

To,
HOD,
Computer Science & Engineering Department.
College of Engineering,
Pandharpur.

Subject: -Letter of Appreciation for your final students.

Dear Sir/Madam,

We are happy to inform you that your following students have interacted our team and visited our sites at DacwayInfo. Solapur for doing their final year project titled **"Fingerprint Based Voting System"** during academic year 2019-20. The notable points of the projects are:

1. It is important for the team to have domain knowledge.
2. Teams that will challenge them through questioning ideas and offering their advice on the best way forward.
3. A software project team will have an extensive background in software development and significant IT domain knowledge.

Name of students:

1. Dhanaraj T Patil
2. Vishal P Munguskar
3. Mujamuil S Shaikh
4. Mayur R Patil
5. Pankaj A Shinde

Dacway Solapur Think. To Start.

DACWAY INFOTECH

ADJ Infotech

22, Veershaiv Nagar,Jule Solapur, Solapur. Cell Number: +919511906919
www.adjinfotech.com Email : onkar@adjinfotech.com

To,

HOD,

Computer Science & Engineering Department.

College of Engineering,

Pandharpur.

Subject: -Letter of Appreciation for your final students.

Dear Sir/Madam,

We are happy to inform you that your following students have interacted our team and visited our sites at ADJ InfoTech, Pvt. Ltd. Solapur for doing their final year project titled **"Smart Farm"** during academic year 2019-20. The notable points of the projects are:

1. It is important for the team to have domain knowledge.
2. Teams that will challenge them through questioning ideas and offering their advice on the best way forward.
3. A software project team will have an extensive background in software development and significant IT domain knowledge.

Name of students:

1. Tarannum N. Tamboli
2. Tarbassum N. Tamboli
3. Pratiksha R. Shindepatil
4. Mayuri Z. Surwase

A.D.J. Infotech Services * Solapur * Pvt. Ltd.

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Cell: +91-9270080011
Email: mail@minditservices.in
Website: www.minditservices.in

Govt. Colony, Opp. Datta Mandir
Miraj - 416 410
Dist. Sangli, Maharashtra

To,

HOD,

Computer Science & Engineering Department.

SVERI's College of Engineering,

Pandharpur.

Subject: -Letter of Appreciation for your final students.

We are happy to inform you that your following students have interacted our team and visited our sites at Mind IT Services at Miraj, Tal. Miraj Dist. Sangli for doing their final year project titled **"Detection of Fake Accounts with Machine Learning"** during academic year 2019-20. The notable points of the projects are

1. It is important for the team to have domain knowledge.
2. Teams that will challenge them through questioning ideas and offering their advice on the best way forward.
3. A software project team will have an extensive background in software development and significant IT domain knowledge.
4. The project is completed on-time, and with all features and functions as initially specified.

Name of students:

1. Ms. Pradipta Mahimkar
2. Ms. Srushti S. Dhavale
3. Ms. Madhura G. Shinde
4. Ms. Prajkta S. Sugandhi

Mind IT Services www.minditservices.in

Authorized Signature

कर्मण्येवाधिकारस्ते मा फलेषु कदाचन । मा कर्मफलहेतुर्भुर्मा ते संगोऽस्त्वकर्मणि ।।

CHATURDASHI ENTERPRISES & IT SERVICES

Vilasrao Shinde Shopping Center, Plot No. 16, Main Road Ashta
Tal-Walwa, Dist-Sangli Pin-416301 UAM No. : MH32D0035615
Contact No.: 8600477947 / 9403985975/76 Email:-ssvs25815@gmail.com.

Ref. No.

Date :- 10|09|2019

To whomsoever it may concern

This is to certify that students of Computer Science and Engineering Department from **SVERI's College of Engineering Pandharpur** are allowed to develop software module for our Company under title of **"Lane detection using Artificial Intellegence."**

The details of operation will be provided as per requirements.

The students are as follows

1. **Ms.** Kumbhar Kajal P
2. **Ms.** Thakare Gayatri S
3. **Ms.** Bhosale Priti
4. **Ms.** Bhui Aparna
5. Ms. Bhosale Pradnya

CHATURDASHI ENTERPRISES & IT SERVICES UAM No. MH32D0035615

Authorized Signature



DUTY IS DEITY

Shri Siddheshwar Devasthan's

Shri Siddheshwar English Medium High School,

1,Siddheshwar Peth, Solapur – 413001
School Index No – 24.09.090
Email address :- siddheshwar.engmed@gmail.com.
☎ – 0217-2748772

Date – 10.04.2019

To,

Inner Voice Project Group

SVERI, Pandharpur

Sub: Sponsorship for developing the website.

Dear Inner Voice Project Group Members,

(Mast. Shubham Shirur, Mast. Rohan Karankoat, Miss. Apurva Mohite, Miss. Khushali Rane and Miss. Ravina Narle)

We are happy to inform you that we have decided to be the sponsor your project of developing website www.innervoice.com.

The enthusiasm and the intent of the project members behind developing the website are appreciated. The purpose of providing the platform to the people to show their talents, skills and represent themselves in their field of interest is commendable and hence we hereby provide you the sponsorship of Rs. 7000/- (Seven Thousand only) including the hosting charges.

Regards,

Mr. Dhananjay S. Sirur
Principal
Shri Siddheshwar English Medium
High School, Solapur

Shri Siddheshwar English Medium High School
SOLAPUR

SVERI's
College of Engineering, Pandharpur

Computer Science & Engineering Department

B.E. Project Record

A.Y.: 2019-2020

SVERI's College of Engineering, Pandharpur
Department of Computer Science & Engineering
BE CSE 2019-20 Project List

Group No	Name of Students	Project Title	Name of Guide
1	AditiGhavate	Homemade Crafts Website (S creation)	Mr. P. G. Gaikwad
	GonjariShivashri P		
	GauriLigade		
	KambleSupriya S		
2	Landage Kajal V	OBJECT DETECTION in python	Mr. S. M. Shinde
	LandagePriya v		
	GuravAishwarya V		
	Babar Sonali D		
	KaziTasmiya J		
3	DanakePrajkta V	IOT based Patient Monitoring System	Dr. Padmanjali
	Thite Kajal		
	SupekarPranali		
	MahajanDnyanada		
	GaikwadSnehal N		
4	Pradip Mali	Car Rental Web Application	Mr. P. K. Kurzekar
	JadhavShrihari K		
	KarankotRohan S		
	KambaleRohit L		
	DolleMahadev I		

Project Coordinator **HoDCSE**

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5	Chavan Ashwini L Done Shilpa S Dahinande Swati R Babar Sonali D KaziTasmiya J	Enhances Security for ATM Machine with OTP and Facial Recognition System	Mr. P. K. Kurzekar
6	Sayali Bhosale JagalpureMansi D DhasadeShraddha S ShraddhaGaikwad	Fake News Analysis	Mr. H. M. Tamboli
7	KhadakeVidya S KshirsagarApurva P Ghongare Pratiksha A BokefodeSanjana M	Face Detection and Recognition using Raspberry Pi	Ms. P. R. Dolas
8	GadhaveVarsha J LawatePoonam S Khapale Monika S ShindeJyotiMadhukar	Speech Recognition in Python.	Ms. S. S. Kadam
9	Khabani V. S. Kasulwar K. V. Anand Mali AbhinavAnand	Development of CAD for early detection of lung cancer using Foldscope.	Ms. V. D. Jadhav
10	ArdakSuraj S. KalshettiAjit P Kedare Vishal G KalekarAditya GundAtul K	Smart Irrigation system using IOT	Mr. N. N. Salvithal

Project Coordinator

HoDCSE

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11	AudumbarNikam KiranSathe BalajiNarwate HarshalRamgude AbhishekKalase	Bike Rental System	Ms. R. R. Shinde
12	RupaliGurav AartiGodase Dixit Girija V SnehalBhosale BagwanRafat R	Advanced Intrusion Detection and Protection System	Ms. S. A. Shegdar
13	Smita Yadav RutujaTaksale Kajal Mali Ratnprabha More	Biometric Attendance System Using IOT	Mr. S. V. Darshane
14	PoojaVibhute Shivani D Soni JyotsnaSalunkhe SnehaPadwal	Smart Garbage Detection and Decomposition	Mrs. S. S. Bhosale
15	ShwetaMisal Vidya More PrajktaSatpute GauriRamnawmiwale DipaliSathe	Conjunction control in wireless network using NS3	Ms. N. D. Deval
16	MinakshiBhosale MadhuriHowal KachareSonali Smita Narkhedkar	Skin Database	Ms. N. D. Deval

Project Coordinator

HoDCSE

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17	RewatiSonkawde ManjushaLimbitote PritiPise MrunaliNanaware BhavanaMusale	Farm equipment rental system	MsAnuradha More
18	Shubham S Shirur SiddhnathBhandare PratapMadgundi Deshmukh A. G.	Skill encouragement website(InnerVoice)	Dr. S. B. Thigale
19	Sukeshani S Shinde Shrutika S. Musale Ayesha L Mulani Archna More VaishanviRandive	Garbage automation using IoT	Mr. N. M. Maske
20	Shweta S Vibhute Akshaya A Sherkar Shradha S Tanawade Aishwarya S Nikam	Share Marketing App	Mr. B. B. Jagdale
21	Khushali C Rane Ravina B Narale SimranSayyad Apurva L Mohite	Online Transport System	Mr. N. N. Salvitthal
22	Dhanaraj T Patil Vishal P Munguskar Mujamuil S Shaikh Mayur R Patil Pankaj A Shinde	Fingerprint Based Voting System	Mr. H. M. Tamboli

Project Coordinator **HoDCSE**

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23	TopageAkshay K. BHARAT K Sutar Ganesh S Rananavare Abhijeet A Patil Rohit Vishnu Nagtilak	Business platform for farmers using Android App	Mr. R. D. Kulkarni
24	Tarannum N Tamboli Tabassum N Tamboli Pratiksha R Shindepatil Mayuri Z Surwase	SmartFarming	Ms. P. R. Dolas
25	SathePrajkta A Patil Mispa S MahimkarShailaja S Kanchan D Tonape LondheMayuri B	Classification of Soil Contamination	Mr. R. B. Kagade
26	Jalindar H Dhembare Akash P Surwase Suyog R Nirmal YogeshShingade Mayur K Vasav	Digital Fine Collection System	Ms. T. A. Dhumal
27	Sanam K Maske Rutuja P Patil Sandhyarani D Tekale Shrilekha B Narkhedkar	Biometric Voting Machine Using UID (Aadhar)	Ms. A. S. Pathan
28	PradiptaMahimkar Srushti S Dhavale Madhura G Shinde Prajkta S Sugandhi	Detection of Fake Accounts with Machine Learning	Mr. V. M. Sale

Project Coordinator

HoDCSE

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29	TanajiKumbhar Harshad More PandurangDandge Avinash Lad	Partial Face Recognition using deep learning	Mr. G. G. Patil
30	DanaveShraddha P BhairiNavina T KambleSnehal A GharbudeSneha H	Flood Prediction using Machine Learning	Ms. R. M. Shinde
31	Kumbhar Kajal P ThakareGayatri S BhosalePriti BhuiAparna BhosalePradnya	Lane detection using Artificial Intelligence.	Ms. R. M. Shinde
32	BhosaleGauri BhosalePriyanka Kale Preeti KambleDipali	Predicting Air Pollution in specified city	Ms. D.V. Patil
33	Nikita Kamble Neha Babar HimangiDoke Tejaswini Chavan	Stock Prices Detector	Ms. A. S. Pathan

Project Coordinator **HoDCSE**

Scanned by CamScanner

SVERI

Engineering for Excellence

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the dissertation entitled

"Homemade Crafts (S creation) Website Development"

has been submitted by

Project Group No.:- 01

1)	Aditi Ghavate Abasaheb
2)	Gonjari Shivashri Prabhakar
3)	Gauri Ligade Anil
4)	Kamble Supriya Sunil

For partial fulfillment of Bachelor Degree in Computer Science and Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. P. G. Gaikwad)
Project Guide

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4) Shinde Jyoti M

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3) BhosalePriti
4) BhuiAparna
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T.E. Mini- Project Record

A.Y.: 2019-2020

SVERI's College of Engineering, Pandharpur
Department of Computer Science & Engineering
TE CSE 2019-20 Mini-Project List

TE A Division			
Group Number	**Name of Student**	**Project Title**	**Allocated Guide**
1	RutujaPravinKachare VaishnaviBhagwanBhadule AishwaryaAtulGaikwad Monika MarutiChavare	Blood and Donar Management System	Dr. B. C. Melinamath
2	FakadeMrunal Mahesh IrkarReshmaDigambar KhatibTaslimRafik RaoSumanSadanand	Plant Monitoring System Using IOT.	Ms. D. V. Patil
3	Yadav PravinaChandrakant MuladeAishwarya TodkariVishnavidevivilas	Hostel Management System	Ms. S. S. Bhosale
4	AfrojZakirSayyad Kajal BanduJadhav Sayali PrakashHajare	Library Management System	Mr. P. K. Kurzekar
5	VrushaliBaswaraj Swami Padmaja Sanjay Shete AsawariSharadShinde Sayali DattatrayAwatade	Bloodbank Management System	Ms. N. D. Deval

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6	ShrutiBabanKawade Aboli Vijay Gaikwad KiranSenapatiKedar Richa Dinesh Tamhane	Prediction of COVID-19 Outbreak using Machine Learning Techniques	Ms. V. D. Jadhav
7	Pratima Sunil Jadhav VishakhaBhaskarKamble SimranShakilMulani ShrutiYashwantTawashe	Café Billing System using C#	Ms. S. S. Kadam
8	AnjumRafikPathan ChaitraliHanumantShiral UmeyaniAkilahmadKamliwale Kajal Maruti Mane	Hospital Management System	Mr. P. K. Kurzekar
9	Sakshi S. Tonape Tejaswini N. Farkande Ashlesha B. Pise Shravani P. Burande	Online Voting System	Mr. N. M. Maske
10	PriyankaAbhayKamble ChaitaliRajendraBochare VaishnaviRavindraDevidas Smita GanpatDhengale	Twitter Sentiment Analysis	Mr. A. M. Dyade
11	YogitaShivajiMasal AkankshaAvadhut Patil SnehalSaudagarKhatal PriyankaVitthalKharade	Online Quiz	Mrs. S. A. Shegdar
12	Rutuja Sanjay More SnehalShivajiKasabe PornimaAjitRajurkar Sayali TanajiMagar	Login using Image Uploading	Ms. N. D. Deval

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13	ManishaBabasahebAkhade AnujaRamdasBhange SnehalTanajiBhusare SoyarabaiUttareshwar Patil DhanashriRajendraAmbure	Music Player Android App	Ms. S. S. Bhosale
14	Ashutosh S. Jawanjal Satyajit A. Kale Nana B. Chavan Kuldip K. Raut Swapnil L. Vasekar	Housing Price Prediction using Machine Learning	Mr. B.B.Jagdale
15	Satyam H. Khandekar Suraj S. Patil Malhar P. Urade SwaritBhandari Amol S. Anuse	Spirit Website	Mr. P. G. Gaikwad
TE B Division			
16	PrachiGurav SnehaShinde KrantiSiddhaganesh RevatiAadhlinge SujataBirajdar	Lab automation by using IOT	Mr. R. B. Kagade
17	PravinShedbale SushantKumbhar SandeshNarkar Deepak Sakhare SumeetMulge	Alzheimer's Disease Early Detection using Machine Learning	Mr.N. N. Salvithal
18	SandeshKoli DhavalKhobare AmolSalunke ShubhamKalpagar	Gas Detection System using IoT	Dr. P. A.Hagargi

Project Coordinator **HoDCSE**

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19	ShivaniShende SrushtiDindore Gayatri Dixit ShraddhaPadwal	Hotel Management System App	Ms. R. M. Shinde
20	AishwaryaMetkari BhagyashriWaghmode Shivani Swami PrajktaAsabe SeemaRaut	Online shopping front end work remainkng to the tune of 20%	Mr. S. V. Darshane
21	YogitaAthawale ChandaniBhoi AnkitaBhoite SakshiMandwale	Student management system	Ms. A. A. More
22	Dhananjay Mane Rajat Gupta RavirajSawant Sanjay Honmane AbhishekAlagi	mCricket IOT Based Demonstration Platform	Mr. N.N. Salvithal
23	SnehaPandit HarshdaBhandare PunamSutar AnuJare	Website designing for Oasis	Mr. R. D. Kulkarni
24	Patil Nikita MundheBhagyashri KhadakeShubhangi	Online Banking System	Mr. V. M. Sale
25	Mamtajangid KavitaPardeshi VaishnaviBhogawakar Chandanshive Pratiksha	UniOS Application	Ms. P. R. Dolas

Project Coordinator

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26	Snehalpatil Dipalijadhav PoojaSarvade Poojabeldar	Student results management system	Mr. B. B. Jagdale
27	Swapnali Patil SumaiyyaManeri PranotiSarvagod KomalKadlaskar DipaliLigade	Android Jewelry Album App	Ms. R. R. Shinde
28	PallaviPangudwale Snehal Swami Swati Shivsharan GawaliPriyanka SupriyaJadhav	Online Shopping	Ms. A. S. Pathan
29	SnehalPise Pratiksha Gaikwad RajshreeGaikwad ShravaniGaikwad	Agroweb Website Development	Mr. H. M. Tamboli
30	PuneetSawhaney AdityaDhaygude KanifnathDake SagarBarle	Rainfall Prediction System	Mr. G.G.Patil
31	HrithvikNamade ArbajShaikh Pruthviraj Patil AmitNannaware	Online Jewelry shopping	Ms. T. A. Dhumal
32	Mahesh Phutane AdarshVernekar VinayakWaghmode RohitGodase	E-classroom	Mr. S. M. Shinde
33	PrafulGaikwad AmitNanaware Sameer Devale BalajiNarvate	Maharashtra Tourism Website	Mr. V. M. Sale

Project Coordinator

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CERTIFICATE

This is to certify that the Mini project entitled

"Blood and Donor Management System"

has been submitted by

Project Group No.:- 01

1) Rutuja Pravin Kachare
2) Vaishnavi Bhagwan Bhadule
3) Aishwarya Atul Gaikwad
4) Monika Maruti Chavare

For partial fulfillment of T.E.(CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Dr. B. C. Melinamath)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

(Dr. B. P. Ronge)

Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Plant Monitoring System Using IOT."

has been submitted by

Project Group No.:- 02

1) Fakade Mrunal Mahesh
2) Irkar Reshma Digambar
3) Khatib Taslim Rafik
4) Rao Suman Sadanand

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(Prof. D. V. Patil)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Hostel Management System"

has been submitted by

Project Group No.:- 03

1) Yadav Pravina Chandrakant
2) Mulade Aishwarya
3) Todkari Vishnavidevi vilas

For partial fulfillment of T.E.(CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. S. S. Bhosale)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

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CERTIFICATE

This is to certify that the Mini project entitled

"Library Management System."

has been submitted by

Project Group No.:- 04

1) Afroj Zakir Sayyad
2) Kajal Bandu Jadhav
3) Sayali Prakash Hajare

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(Prof. P. K. Kurzekar)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

(Dr. B. P. Ronge)
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CERTIFICATE

This is to certify that the Mini project entitled

"Bloodbank Management System"

has been submitted by

Project Group No.:- 05

1) Vrushali Baswaraj Swami
2) Padmaja Sanjay Shete
3) Asawari Sharad Shinde
4) Sayali Dattatray Awatade

For partial fulfillment of T.E.(CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

N.D.Deval.

(Prof. N. D. Deval)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

B.Ronge

(Dr. B. P. Ronge)

Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Prediction of COVID-19 Outbreak using Machine Learning Techniques"

has been submitted by

Project Group No.:- 06

1) Shruti Baban Kawade
2) Aboli Vijay Gaikwad
3) Kiran Senapati Kedar
4) Richa Dinesh Tamhane

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(Prof. V. D.Jadhav)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

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CERTIFICATE

This is to certify that the Mini project entitled

"Café Billing System using C#"

has been submitted by

Project Group No.:- 07

1) Pratima Sunil Jadhav
2) Vishakha Bhaskar Kamble
3) Simran Shakil Mulani
4) Shruti Yashwant Tawashe

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ssKadam

(Prof. S. S. Kadam)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

(Dr. B. P. Ronge)

Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Hospital Management System."

has been submitted by

Project Group No.:- 08

1) Anjum Rafik Pathan
2) Chaitrali Hanumant Shiral
3) Umeyani Akilahmad Kamliwale
4) Kajal Maruti Mane

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(Prof. P. K. Kurzekar)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

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CERTIFICATE

This is to certify that the Mini project entitled

"Online Voting System"

has been submitted by

Project Group No.:- 09

1) Sakshi S. Tonape
2) Tejaswini N. Farkande
3) Ashlesha B. Pise
4) Shravani P. Burande

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(Prof. N. M. Maske)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

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CERTIFICATE

This is to certify that the Mini project entitled

"Twitter Sentiment Analysis"

has been submitted by

Project Group No.:- 10

1) Priyanka Abhay Kamble
2) Chaitali Rajendra Bochare
3) Vaishnavi Ravindra Devidas
4) Smita Ganpat Dhengale

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(Prof. A. M. Dyade)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

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CERTIFICATE

This is to certify that the Mini project entitled

"Online Quiz"

has been submitted by

Project Group No.:- 11

1) Yogita Shivaji Masal
2) Akanksha Avadhut Patil
3) Snehal Saudagar Khatal
4) Priyanka Vitthal Kharade

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(Prof. S. A. Shegdar)

Project Guide

(Dr. B. C. Melinamath)

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CERTIFICATE

This is to certify that the Mini project entitled

"Login using Image Uploading"

has been submitted by

Project Group No.:- 12

1) Rutuja Sanjay More
2) Snehal Shivaji Kasabe
3) Pornima Ajit Rajurkar
4) Sayali Tanaji Magar

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N.D.Deval

(Prof. N. D. Deval)

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Head, CSE Dept.

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CERTIFICATE

This is to certify that the Mini project entitled

"Music Player Android App"

has been submitted by

Project Group No.:- 13

1) Manisha Babasaheb Akhade
2) Anuja Ramdas Bhange
3) Snehal Tanaji Bhusare
4) Soyarabai Uttareshwar Patil
5) Dhanashri Rajendra Ambure

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(Prof. S. S. Bhosale)

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(Dr. B. C. Melinamath)

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CERTIFICATE

This is to certify that the Mini project entitled

"Housing Price Prediction using Machine Learning"

has been submitted by

Project Group No.:- 14

1) Ashutosh S. Jawanjal
2) Satyajit A. Kale
3) Nana B. Chavan
4) Kuldip K. Raut
5) Swapnil L. Vasekar

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B B Jagdale

(Prof. B.B.Jagdale)

Project Guide

B. C. M.

(Dr. B. C. Melinamath)

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B. P. Ronge

(Dr. B. P. Ronge)

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CERTIFICATE

This is to certify that the Mini project entitled

"Spirit Website"

has been submitted by

Project Group No.:- 15

1) Satyam H. Khandekar
2) Suraj S. Patil
3) Malhar P. Urade
4) Swarit Bhandari
5) Amol S. Anuse

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(Prof. P. G. Gaikwad)

Project Guide

(Dr. B. C. Melinamath)

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CERTIFICATE

This is to certify that the Mini project entitled

"Lab automation by using IOT"

has been submitted by

Project Group No.:- 16

1) Prachi Gurav
2) Sneha Shinde
3) Kranti Siddhaganesh
4) Revati Aadhlinge
5) Sujata Birajdar

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(Prof. R. B. Kagade)

Project Guide

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CERTIFICATE

This is to certify that the Mini project entitled

"Alzheimer's Disease Early Detection using Machine Learning"

has been submitted by

Project Group No.:- 17

1) Pravin Shedbale
2) Sushant Kumbhar
3) Sandesh Narkar
4) Deepak Sakhare
5) Sumeet Mulge

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N N Salvithal

(Prof. N. N. Salvithal)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

B. P. Ronge

(Dr. B. P. Ronge)

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CERTIFICATE

This is to certify that the Mini project entitled

"Gas Detection System using IoT"

has been submitted by

Project Group No.:-18

1) SandeshKoli
2) DhavalKhobare
3) AmolSalunke
4) ShubhamKalpagar

For partial fulfillment of T.E.(CSE) Part II Mini Projectas per curriculum laid by the PunyashlokAhilyadeviHolkarSolapur University, Solapur during the academic year 2019-2020.

(Dr. P. A. Hagargi)
Project Guide

(Dr. B. C. Melinamath)
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CERTIFICATE

This is to certify that the Mini project entitled

"Hotel Management System App"

has been submitted by

Project Group No.:- 19

1) Shivani Shende
2) Srushti Dindore
3) Gayatri Dixit
4) Shraddha Padwal

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CERTIFICATE

This is to certify that the Mini project entitled

"Online shopping front end work remainkng to the tune of 20%"

has been submitted by

Project Group No.:- 20

1) Aishwarya Metkari
2) Bhagyashri Waghmode
3) Shivani Swami
4) Prajkta Asabe
5) Seema Raut

For partial fulfillment of T.E. (CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. S. V. Darshane)
Project Guide

(Dr. B. C. Melinamath)
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(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Student management system"

has been submitted by

Project Group No.:- 21

1) Yogita Athawale
2) Chandani Bhoi
3) Ankita Bhoite
4) Sakshi Mandwale

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(Prof. A. A. More)
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(Dr. B. C. Melinamath)
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(Dr. B. P. Ronge)
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CERTIFICATE

This is to certify that the Mini project entitled

"mCricket IOT Based Demonstration Platform"

has been submitted by

Project Group No.:- 22

1) Dhananjay Mane
2) Rajat Gupta
3) Raviraj Sawant
4) Sanjay Honmane
5) Abhishek Alagi

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(Prof. N. N. Salvithal)
Project Guide

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CERTIFICATE

This is to certify that the Mini project entitled

"Website designing for Oasis"

has been submitted by

Project Group No.:- 23

1) Sneha Pandit
2) Harshda Bhandare
3) Punam Sutar
4) Anu Jare

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(Prof. R. D. Kulkarni)
Project Guide

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(Dr. B. P. Ronge)
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CERTIFICATE

This is to certify that the Mini project entitled

"Online Banking System"

has been submitted by

Project Group No.:- 24

1) Patil Nikita
2) Mundhe Bhagyashri
3) Khadake Shubhangi

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(Prof. V. M. Sale)
Project Guide

(Dr. B. C. Melinamath)
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CERTIFICATE

This is to certify that the Mini project entitled

"UniOS Application"

has been submitted by

Project Group No.:- 25

1) Mamta jangid
2) Kavita Pardeshi
3) Vaishnavi Bhogawakar
4) Chandanshive Pratiksha

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(Prof. P. R. Dolas)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

(Dr. B. P. Ronge)
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CERTIFICATE

This is to certify that the Mini project entitled

"Student results management system"

has been submitted by

Project Group No.:- 26

1) Snehal Patil
2) Dipali Jadhav
3) Pooja Sarvade
4) Pooja Beldar

For partial fulfillment of T.E. (CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. B. B. Jagdale)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Android Jewelry Album App"

has been submitted by

Project Group No.:- 27

1) Swapnali Patil
2) Sumaiyya Maneri
3) Pranoti Sarvagod
4) Komal Kadlaskar
5) Dipali Ligade

For partial fulfillment of T.E. (CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. R. R. Shinde)
Project Guide

(Dr. B. C. Melinamath)
Head, CSE Dept.

(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Online Shopping"

has been submitted by

Project Group No.:- 28

1) Pallavi Pangudwale
2) Snehal Swami
3) Swati Shivsharan
4) Gawali Priyanka
5) Supriya Jadhav

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A.S.Pathan

(Prof. A. S. Pathan)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

B. Ronge

(Dr. B. P. Ronge)

Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Agroweb Website Development"

has been submitted by

Project Group No.:- 29

1) Snehal Pise
2) Pratiksha Gaikwad
3) Rajshree Gaikwad
4) Shravani Gaikwad

For partial fulfillment of T.E.(CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. H. M. Tamboli)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

(Dr. B. P. Ronge)

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CERTIFICATE

This is to certify that the Mini project entitled

"Rainfall Prediction System."

has been submitted by

Project Group No.:- 30

1) Puneet Sawhaney
2) Aditya Dhaygude
3) Kanifnath Dake
4) Sagar Barle

For partial fulfillment of T.E.(CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. G.G.Patil)

Project Guide

(Dr. B. C. Melinamath)

Head, CSE Dept.

(Dr. B. P. Ronge)

Principal

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CERTIFICATE

This is to certify that the Mini project entitled

"Online Jwellery shopping"

has been submitted by

Project Group No.:- 31

1) Hrithvik Namade
2) Arbaj Shaikh
3) Pruthviraj Patil
4) Amit Nannaware

For partial fulfillment of T.E.(CSE) Part II Mini Project as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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Project Guide

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Head, CSE Dept.

(Dr. B. P. Ronge)
Principal

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CERTIFICATE

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SVERI's
College of Engineering, Pandharpur

Department of Computer Science & Engineering

B.E. Project Sample Report

A.Y.: 2019-2020

A

Project Report on

"Home-made Craft Website"

Submitted to,

Department of Computer Science & Engineering

By,

Miss. Ghavate Aditi A. (Class: BE, Div.: A, Roll No.: 19)
Miss. Ligade Gauri A. (Class: BE, Div.: C, Roll No.: 25)
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Under the Guidance of

Mr. Gaikwad P.G.

In partial fulfillment for the award of the degree of



SHRI VITHAL EDUCATION and RESEARCH INSTITUTES's, COLLEGE OF ENGINEERING, PANDHARPUR

AFFILIATED TO PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

2019-20

Abstract

Homemade craft website is totally related with the selling and marketing of the craft products. This is a small scale project for Online homemade craft / shopping system. The basic idea is that customers can buy products using online system. The Online homemade craft Shopping system enables vendors to set up online products with sections. We are providing the products section wise. So the customers can browse through the sections. The aim of this project is on the online shopping application it is developed using HTML5, Java script, CSS, PHP. The agenda is designing an online shopping site to manage the items in the shop and also help customers purchase them online without having to visit the shop physically. Our online shopping system will use the internet as the sole method for selling items to its consumers. Shopping will be highly personalized and the system will provide lower prices than most competitors. It is an online store that enables website owners to sell their product online. It is a web shopping cart that web enables the day-day sales functions. It includes product and customer management modules. This website will be useful to anyone who wants to purchase items using internet. We are going to store the data in our database. So that in case of any query it will be easily retrieved.

SYNOPSIS

1.Synopsis of Project Work :

a) Relevance:

Now a days internet makes the things much easier and faster. Its led to changes in the way people do business with a rapidly growing worldwide trend towards online shopping or e-commerce. Online shopping is considered to be a very helpful way of buying products through the internet especially during the holidays and clearance seasons. It allows customers to enjoy a wide variety of products and items not only from specific stores but also from a diverse storage that includes all kinds of items. Online shopping also provides customers with a good customer service that also occurs online.

b) Present theories and practices:

i Amazon :

Amazon(Amazon.com) is world's largest online retailer and a prominent cloud service provider. The company was originally a book seller but has expanded to sell a wide variety of consumer goods and digital media as well as its own electronic devices such as the kindle e-book reader. Kindle fire table and Fire TV , a streaming media adapter, etc.

ii Flipkart :

Today Flipkart is Indias largest online e-commerce website. Flipkart was started in 2007 and recently it also acquired an online fashion e-commerce Store Mantra for 300 Million. The annual revenue of Flipkart is Rs. 5000 crores. In the world ,among the top 100 websites, Flipkart is ranked 82nd by Alexa, and 7th position as in India.

c) Proposed work :

i. Scope of project :

A. The scope of Home-made craft website is to sell the craft products.
B. User can directly contact with the admin.
C. Payment can be done by online ways as well as cash on delivery is also available.
D. It will perform the required task of finding customers and clients information in easiest way.

ii. Objectives :

The main objective of this website is it enables user for buying the products and also they can get the items as per their requirement. Various types of products such as decorative pieces, beauty products, crochet etc. are available in this website.

A. Storing Customer Details and Display Our Pride Customers:

Our website stores the all information about customers, also stores the information about the blood donors and display the pride customers.

B. User Friendly:

The website will be more user friendly as compared to other systems. To develop an easy to use web based interface where user can search for products, view a complete description of the products and can order for the products. A user can view the complete specification of the product along with various images. They can also write their feedback about product.

C. Phase wise Proposed Work:

Phase I	Phase II
Finalizing project topic	Coding
Requirement Collection	Database Connectivity
Design the modules	Testing and Validation
Database Design	

2.Facilities Available:

a) Internet

b) Required configured machine

c) Required software

3.Approxiamate expenditure:

a) Domain Cost → Rs 999/-

b) Web Hosting → Rs 2500/-

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Abbreviation

HTML → Hyper Text Markup Language

CSS → Cascading Style Sheets

PHP → Personal Home page

DFD → Data Flow Diagram

DBMS → Database Management System

ER → Entity Relationship

RDBMS → Relational Database Management System

SQL → Structured Query Language

URL → Uniform Resource Locator

UML → Unified Modeling Language

WWW → World Wide Web

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Chapter 1

1 INTRODUCTION

1.1 Introduction

Shopping has been considered a recreational by many. The goal of this website is to develop web based interface for online retails. The system would be easy to use and hence make the shopping experience pleas- ant for the users.

The goal of this website is:

- To develop an easy to use web based interface where user can search for craft, view a complete description of the crafts and order the craft.
- Drag and Drop feature which would allow the users to add a product to or remove a product from the shopping cart by dragging the product in to the shopping cart or out of the shopping cart.
- A user can view the complete specification of the product along with various images and also view the customer review of the product. They can also write their own review.

In today's world, people don't have time for their personal needs. The innovation is fast to the point that anybody can do anything by simply sitting in a room. So, it is an imperative issue as per observation. The internet is the way that helps a person in all aspects. In the event that somebody wish to purchase and view things, they can purchase online with the assistance of web. Commercial centers like Flipkart, Amazon and Snapdeal are giving gigantic chances to youthful understudies, housewives just as little shop

proprietors to scale their organizations and win great cash [1] [13]. Not with standing, there are different variables that one needs to take a gander at before beginning up an online business. Setting up an online shop to move your items can be a valuable and beneficial method for working together.

It enables you to work without fundamentally requiring a conventional shop front and gives your clients greater adaptability since they can purchase your items whenever of the day. Web based moving can likewise widen your client base, as you can pitch to individuals who are interstate or abroad. Internet shopping doesn't speak to everybody, so ensure your objective market is OK with purchasing on the web before you begin. You may discover you can achieve more clients by offering web based shopping close by a customary shop. Web based shopping makes utilization of advanced innovation for dealing with the stream of data, items, and instalment between shopper, website proprietors and providers.

1.2 Need of the Work

There are large numbers of commercial Online Shopping Websites offering large number of products tailored to meet the shopping interests of large number of customers. These online marketplaces have thousands of products listed under various categories.

Shopping has been considered a recreational by many. Online shopping no exception. The goal of this website is to develop web based interface for online retails. The system would be easy to use and hence make the shopping experience pleasant for the users.

Problem: The basic problems with the existing systems are the non-interative environment they provide to users. The use of traditional user interface which make continuous post to the server. Each post back makes a call to server, gets the response and then refreshes the entire web form to display the result. This scenario adds an extra trade off causing a delay in displaying the results.

• Use of traditional and non-user friendly interfaces that are hard to use.

Solution:

- The Motive of this Online Shopping Website is to allow the user for Online Shopping.

- Provide Interactive interface through which a user can interact with different areas of website easily.

1.3 Objectives:

The main objective s of the website to overcome the drawbacks of the existing and some advantages of new system is as follows:

1.4.1 Storing Customer Details:

Our website stores the all information about customers. Because now a days it essential to know about our clients.

1.4.2 User Friendly:

The new website is more user friendly as user can contact with admin if any issue occurs.

Chapter 2

LITURATURE SURVEY

- **Existing System**

E-Commerce software can be used to manage your online store and handle aspects such as adding and removing products, tracking inventory, calculating taxes and other work required to fulfill orders placed on the website. Currently most popular systems are discussed as follows:

1. **Amazon:**

Amazon (Amazon.com) is the world's largest online retailer and a prominent cloud service provider. The company was originally a book seller but has expanded to sell a wide variety of consumer goods and digital media as well as its own electronic devices, such as the Kindle e-book reader, Kindle Fire tablet and Fire TV, a streaming media adapter, etc.

2. **Flipkart:**

Today, Flipkart is India's largest online e-commerce website. Flipkart was started in 2007 and recently it also acquired an online fashion e-commerce store Mantra for 300 Million. The annual revenue of Flipkart is Rs. 5000 crores. In the world, among the top 100 websites, Flipkart is ranked 82nd by Alexa, and 7th position as in India.

2.2 Problem Definition

Purchasing and selling products offline, then you will restrict to sell the products in limited area where the shop is located. While purchasing any product customer 4 have to visit many websites for price, feature comparison, delivery time and availability of product. Customer generally suffer from unnecessary notification and redirection.

2.3 Proposed System

We are going to provide solution to address this issue through online website. We have considered home made craft products also we are going to provide facilities to user so that they can give feeback for the product. The details of design and implementation is discussed in the successive sections.

A. Modular Design

The functionality of the proposed application is divided into number of sub modules. The modules to be taken into account are customer shopping cart, orders, payment and product module. These modules while integrated together give the functionality desired out of the application.

B. Customer

In this module the client information is processed. This information includes giving username and password to login to this site. This is required to verify the user. The email id of the customer is used to confirm the customers' orders and also to send promotional emails [10].

C. Shopping Cart

This sub-module lets the user to select the items that they intend to buy to store in cart before placing the order. The items can be stored into the cart and it can be deleted from the cart.

D. Order

In this module customer order is processed. The user can place the order for the items they want to buy. It verifies the pin code and it confirms the order to delivered place. At the shipping address the product should be delivered.

E. Payment

In this sub module payment options for the order is given and processed. Payment would be through credit card, debit card, E-cash or cash on delivery. The total charges of the product are the sum of cost of the product and delivery charges will be deducted from the users account in case of payment options other than cash on delivery.

F. Product

In this module product details can be added to the database. The tax per product and actual price of the products can be added. The product details can be edited by admin. The products are stored as per category. Arrangement of products into categories enables the user to search the products based on its category. The database is normalized [13] so that the redundancy is minimized. The database for the proposed application is normalized up to third normal form

2.3.1 System Architecture

The Admin side DFD [2][3] describe the functionality of Admin. Admin is an owner of the website. Admin can add category of item and then add items by category wise and admin can manage order and payment detail. The Customer side DFD describe the functionality of Customer. Customer should login with correct credentials.

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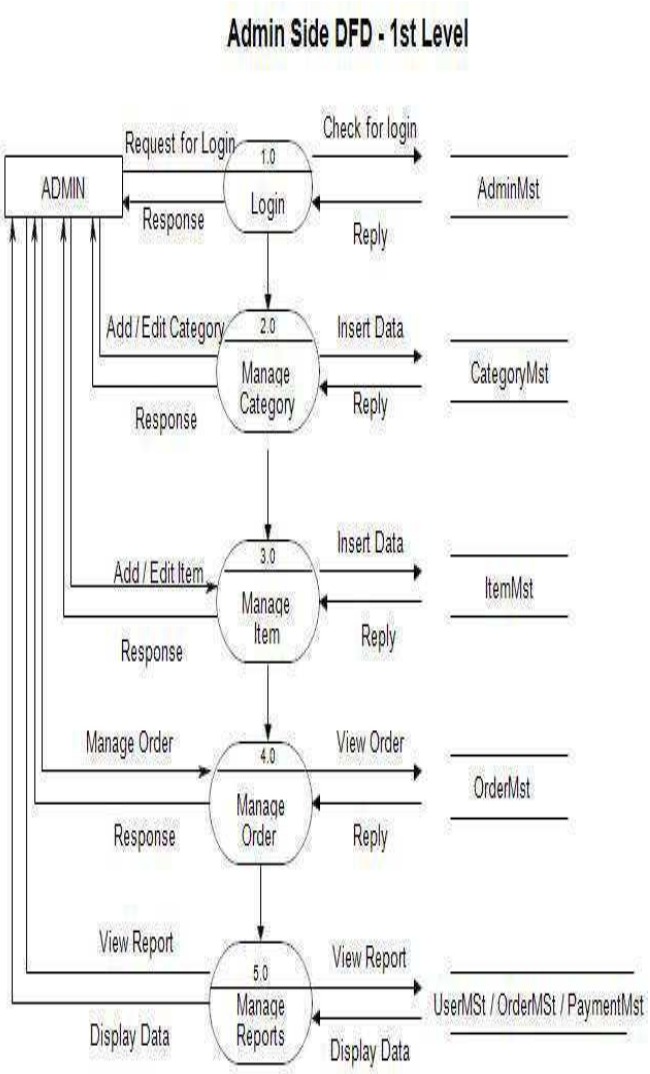


Figure 2.1: System Structure of Admin

The Customer side DFD describe the functionality of Customer. Customer should login with correct credentials. Customer select the product as per their requirements specification, description. Then it should place the order through the payments. Customer can pay the payment through net banking credit card, debit card and cash on delivery.

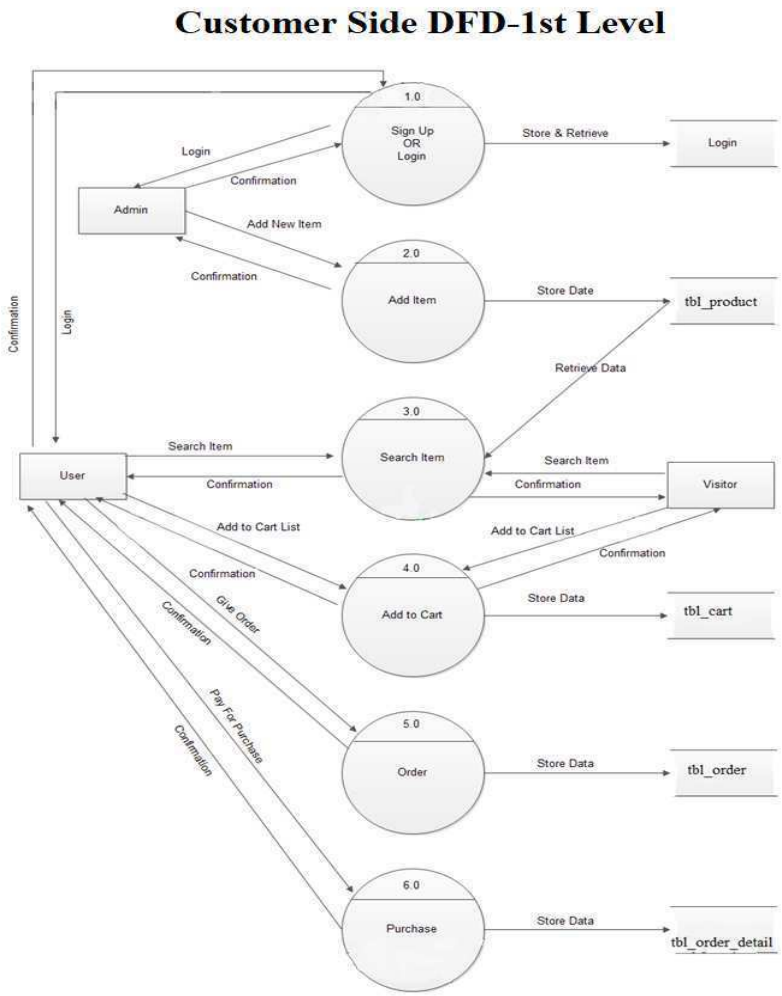


Figure 2.2: System Structure of User

2.3.2 Modules to be implement

The website design in this project needs a web browser and a database for implementation at the server side and only a web browser at the client side. The user types the URL corresponding to the website so that they can easily get it Web server

accepts the incoming HTTP requests and returns the requested information in an HTTP response. The application is developed using HTML as, and MYSQL workbench as the back end.

Integrating the website and the database:

Customers ordering the products from an e-commerce website should be able to get the information of products, ask questions, review, and give feedback on the products, select the products they would like to buy, submit payments. Admin should be able to keep track of the products ordered, payment details, customer inquiries. So a well-organized database is very essential for maintenance of an e-commerce website. The user must be able to access the data base and for this the remote database connectivity is established. The user information is stored in and retrieved from the remote database. The database used in this paper is MYSQL Server.

Webpage design:

The web pages are designed in HTML and Java Script [8][9]. The web pages should be dynamic in nature as the user should be able to access the product details, make payment, post feedback, etc. The static web pages are used for displaying the product description, privacy policy and so on. ASP is used as middle tier that establishes the necessary connection with the database to retrieve the information from the remote database.

1. **User Account Module:**

User accounts the executive's module keep up the data pretty much every one of the users like location, contact no, their past item decisions and so forth. This data is exceptionally valuable for fruitful online business advertise.

Enable Account Login a customer login is created (associated with the email address of the customer) to login to their account dashboard to access past orders and downloads, and to make future checkouts faster and easier. During checkout, clients set a password to access their account. They can then login to their account on the stores account page with their email address and their specified password.

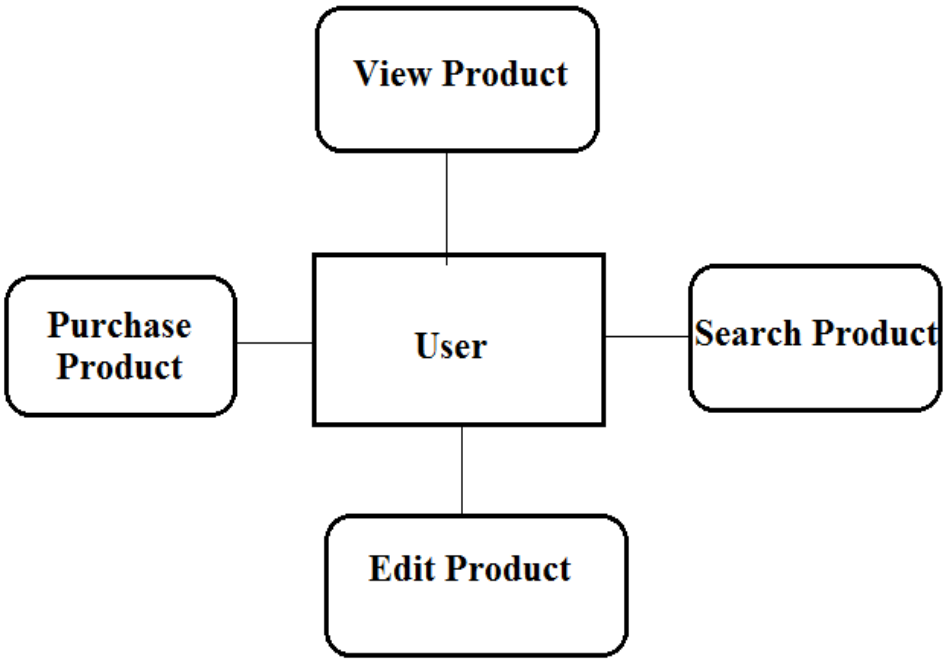


Figure 2.3: User Module

• Registration

A new user will have to register in the system by providing essential details in order to view the products in the system. The admin must accept a new user by unblocking him.

• Login

A user must login with his user name and password to the system after registration.

• **View Products**

User can view the list of products based on their names after successful login. A detailed description of a particular product with product name, products details, product image, price can be viewed by users.

• **Search Product**

Users can search for a particular product in the list by name.

• **Add to cart:**

The user can add the desired product into his cart by clicking add to cart option on the product. User can view his cart by clicking on the cart button. All products added by cart can be viewed in the cart. User can remove an item from the cart by clicking remove.

• **Submit Cart:**

After confirming the items in the cart the user can submit the cart by providing a delivery address. On successful submitting the cart will become empty.

2. Admin Account Module:

The administrator is the super user of this website. Only admin have access into this admin page. The administrator has all the information about all the users and about all products.

This module is divided into different sub-modules.

• Manage Products

• Manage Users

• Manage Orders

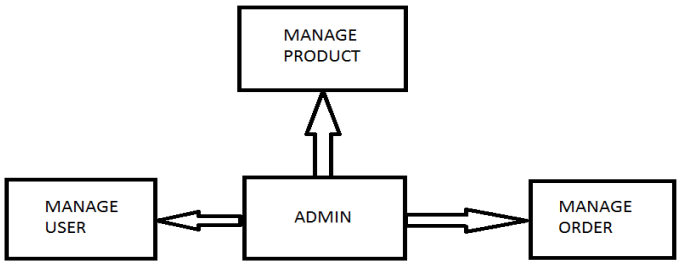


Figure 2.4 : Admin module

A. Manage Module

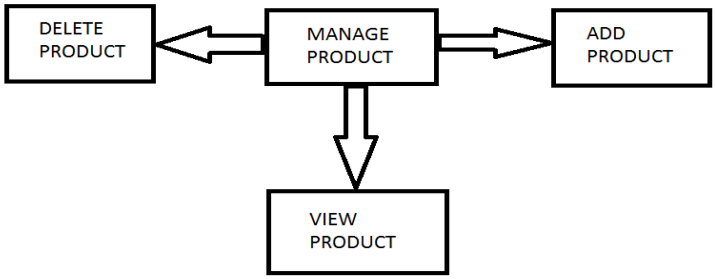


Figure 2.5 : Manage Products

• Add Products

The shopping cart project contains different kind of products as shown in fig 2. The products can be classified into different categories by name. Admin can add new products into the existing system with all its details including an image.

• Delete Products

Administrator can delete the products based on the stock of that particular product.

• Search products

Admin will have a list view of all the existing products. He can also search for a particular product by name.

• View Users

The admin will have a list view of all the users registered in the system. Admin can view all the details of each user in the list except password.

• Add Users

Admin has privileges to add a user directly by providing the details.

C. Manage Orders :



Figure 2.6 Manage Order

• View Order

Administrator can view the Orders which is generated by the users. He can verify the details of the purchase.

• Delete order

Admin can delete order from the orders list when the product is taken for delivery.

Working:

The administrator is given the benefits to change and refresh the database. The administrator includes new items, settles on the ideas on certain items. The items that are not sought after can be for all time erased from the database which implies that the closeout of those items on the site is ceased. The seller subtleties, installments to the merchant are to be taken consideration by the administrator. The transportation subtleties, for example, the regions where the delivery offices are accessible, the subtleties of the delivery organizations and the exchange between them are to be checked. The administrator can choose the money down office to make accessible in all territories or limit to certain regions as it were. The reports of the regular deal, benefit, the items are very on interest, etc. are produced according to the demand. The report age

isn’t feasible for the client. A client suspected to have broken the protection strategy can be hindered by the administrator.

Promotional mails can be sent to the customer’s e-mail id based on their address. The heuristics analysis is to be made on a particular customer to know their interests. So that only on those products, the promotional mails can be sent to that customer.

The customer accesses the website by typing the URL corresponding to the website. The user can request for product details by clicking the products menu. The user is provided with two types of wish lists on site wish list and off site wish list. In the list the user is allowed to add any product available on the site to the list.

The customer should sign up for the first time to place order of a product. Later each time user to buy products he should login. The wish list of the user can be maintained if and only if the user has an account in the database. The product that user want to buy will be added to the cart, and if user to see some more products he can continue while one or more products are on the cart. The order of the products is placed from the cart. The products in the cart can be removed, more products can be added. Once the order is placed the next step would be to give the order details. The user is asked to type his address, mobile number and pin code. Pin code is used to check the availability of the shipping service to given place.

The next step is payment. The payment can be done through credit card, debit card, pay pal and cash on delivery. If the user wants to make the payment via credit card or debit card, then the card details are asked. Once the user enters the card details the user is directed to a payment gateway for the transaction. Once the order is placed then mail will be send to the user.

The user is informed via e-mail while the order is processed, shipped, and delivered at the destination. The user will be given an order id which will help in tracking the order. The order can be cancelled before it is being shipped. The return policy is specified by the admin. The recently viewed products are displayed on the user’s home page. The user can assign rating to products, review the products and give feedback. The purchase history of the user is maintained.

2.4 Advantages of Proposed System

1. Providing useful information and developing the products according to user requirement
2. Direct contact with admin
3. No need to login for viewing the products
4. Easy to handle
5. Make System Configuration as per requirement.
6. Create System Configuration and use later selling purpose.
7. Quickly creating database backup.
8. Customize bill that you want.
9. Create estimates and later convert into bills.
10. Manufacturing's Administration.
11. Server database provide and protected from unauthorized modification.
12. Selling quickly and efficiently

Chapter 3

SYSTEM ANALYSIS AND DESIGN

System analysis is the process of gathering and interpreting facts, diagnosing problems and using the information to recommend improvements on the system. System analysis is a problem solving activity that requires intensive communication between the system users and system developers.

System analysis or study is an important phase of any system development process. The system is viewed as a whole, the inputs are identified and the system is subjected to close study to identify the problem areas. The solutions are given as a proposal. The proposal is reviewed on user request and suitable changes are made. This loop ends as soon as the user is satisfied with the proposal.

3.1 Requirement Specification

3.1.1 Non Functional Requirements

i Efficiency Requirements

When an online shopping cart website implemented customer can purchase product in an efficient manner.

ii Reliability Requirements

The system should provide a reliable environment to both customers and owner. All orders should be reaching at the admin without any errors.

iii Usability Requirements

The website is designed for user friendly environment and ease of use.

iv Implementation Requirements

Implementation of the system using CSS and html in front-end with HTML5 and CSS. PHP will be used for database connectivity. And the database part is developed by MYSQL. Responsive web designing is used for making the website compatible for any type of screen.

3.1.2 Functional Requirements

I. User

• User Login

Description of feature

This feature used by the user to login into system. A user must login with his user name and password to the system after registration. If they are invalid, the user not allowed to enter the system.

Functional requirement

- Username and password will be provided after user registration is confirmed.
- Password should be hidden from others while typing it in the field.

• Register New User

Description of feature

A new user will have to register in the system by providing essential details in order to view the products in the system. The admin must accept a new user by unblocking him.

Functional requirement

- System must be able to verify and validate information.

- The system must encrypt the password of the customer to provide security.

• Purchasing an Item

Description of feature

The user can add the desired product into his cart by clicking add to cart option on the product. He can view his cart by clicking on the cart button. All products added by cart can be viewed in the cart. User can remove an item from the cart by clicking remove. After confirming the items in the cart the user can submit the cart by providing a delivery address. On successful submitting the cart will become empty.

Functional requirement

- System must ensure that, only a registered customer can purchase items.

II. Admin

• Manage User

Description of feature

The administrator can add user, delete user, view user.

• Manage Products

Description of feature

The administrator can add product, delete product and view product.

• Manage Orders

Description of feature

The administrator can view orders and delete orders.

Functional requirement

- The system must identify the login of the admin.

- Admin account should be secured so that only owner of the shop can access that account.

3.2 UML Diagrams

3.2.1 ER Diagrams

• LOGIN

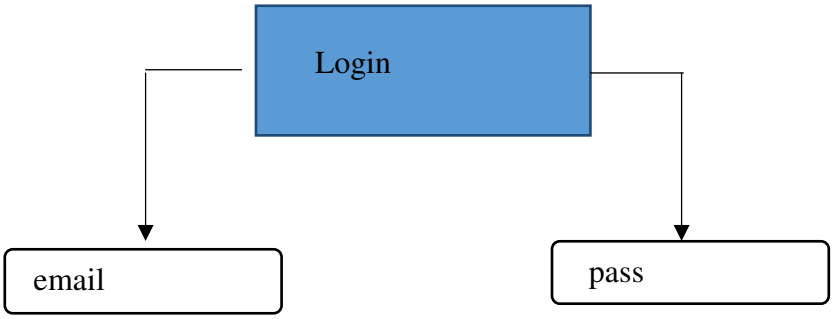


Figure 3.1: Login

• **USER DETAILS**

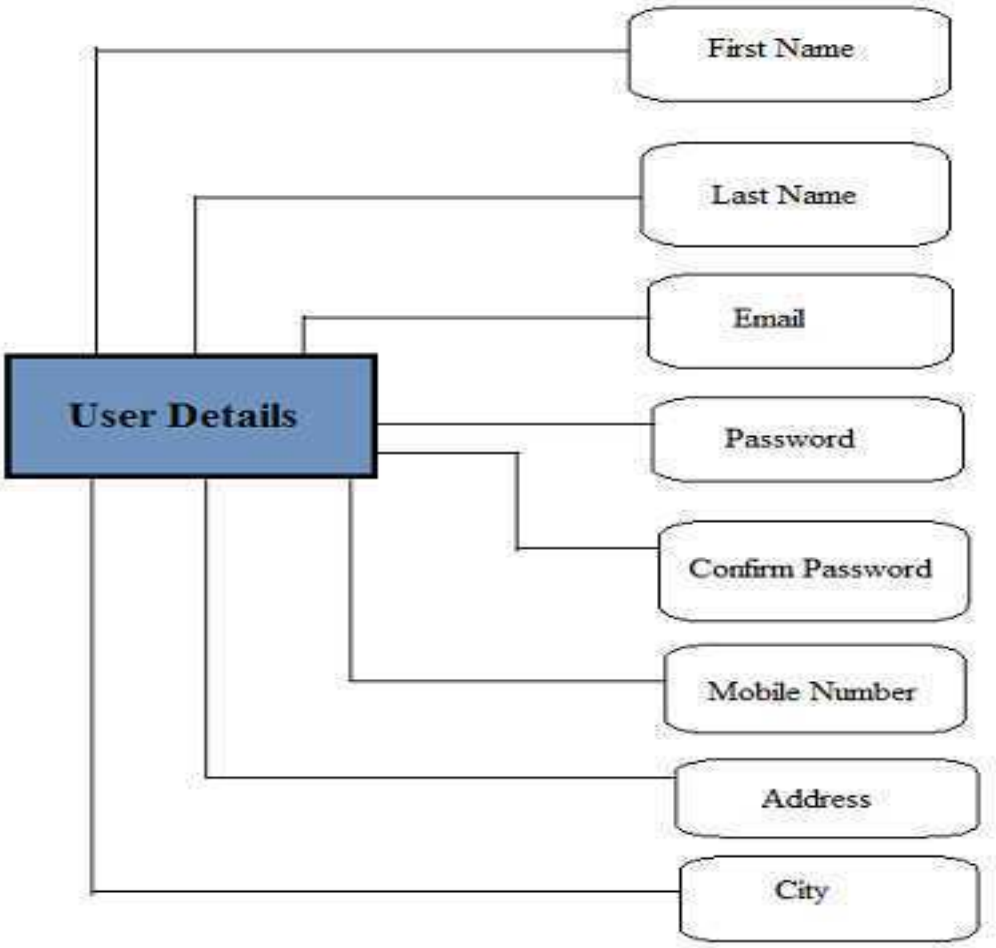


Figure 3.2: User Details

• **PRODUCT DETAILS**

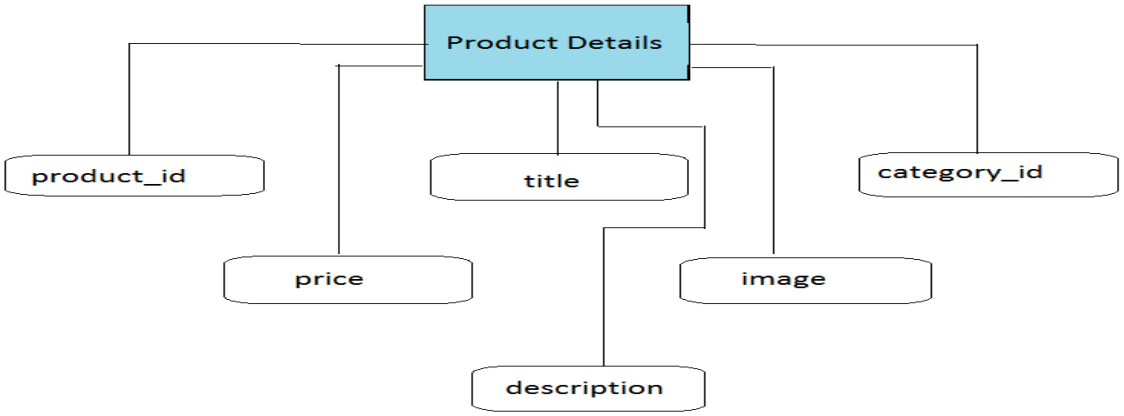


Figure 3.3: Product Details

• **PRODUCT ORDERS**

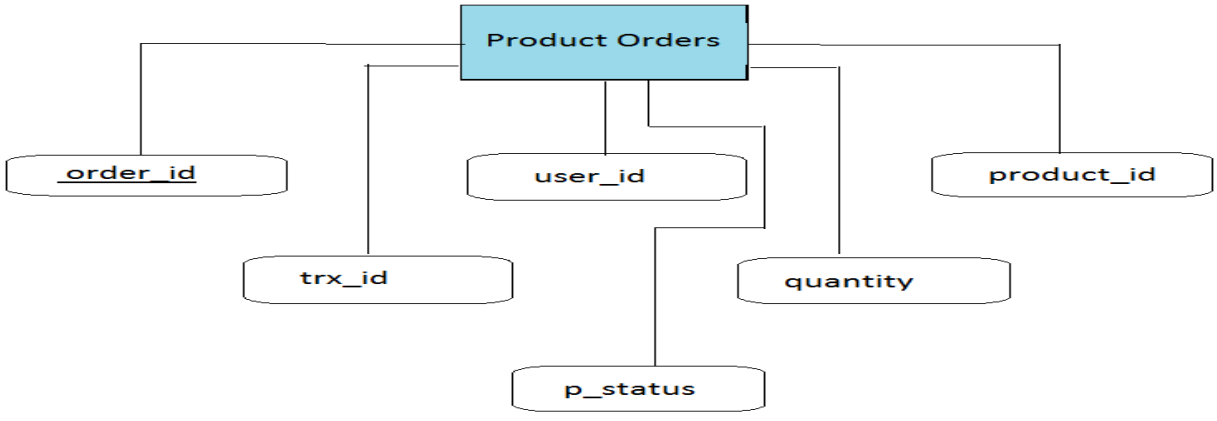


Figure 3.4: Product Orders

- **ER Diagram**

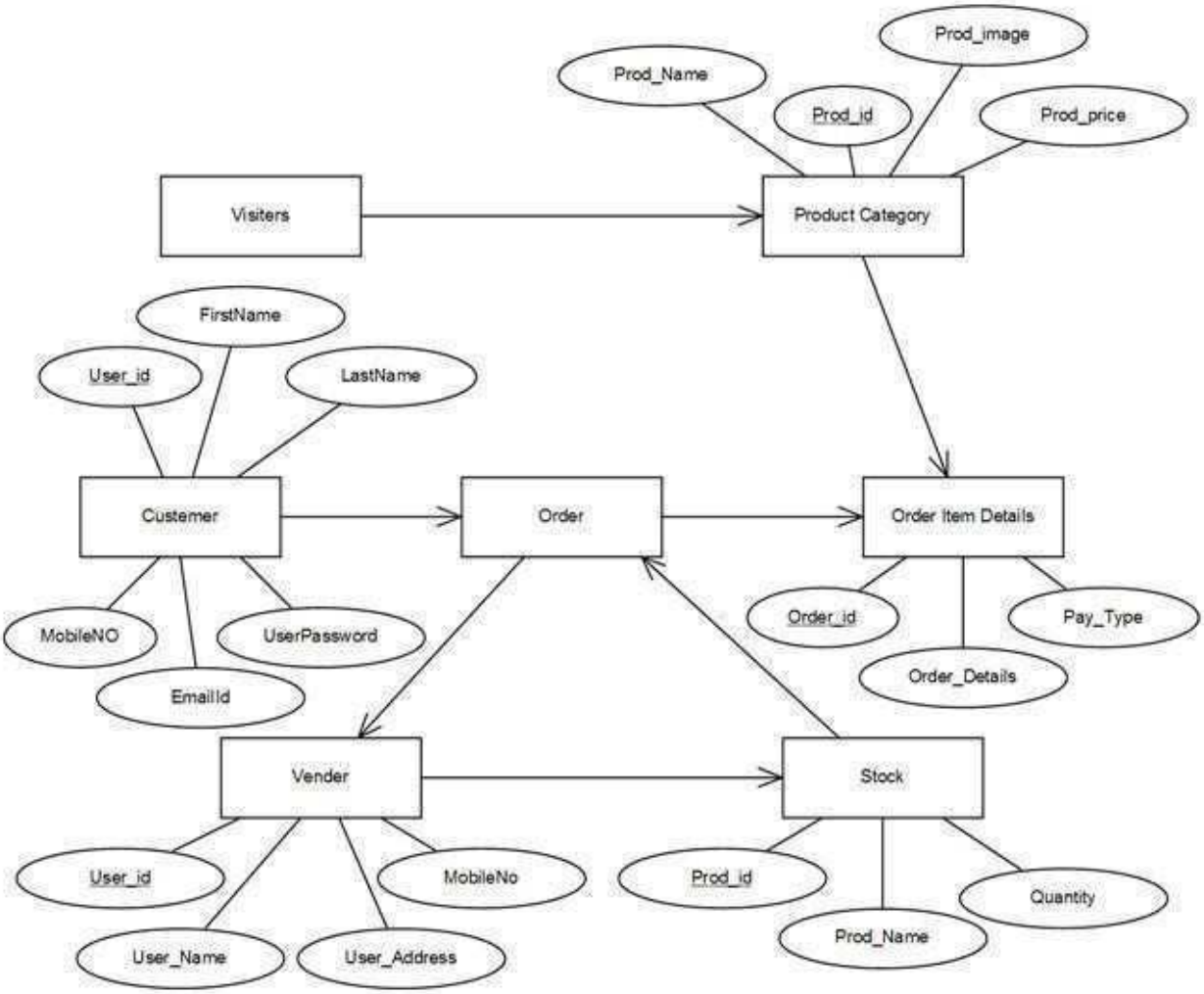


Figure 3.5: ER Diagram

3.2.2 Data Flow Diagram

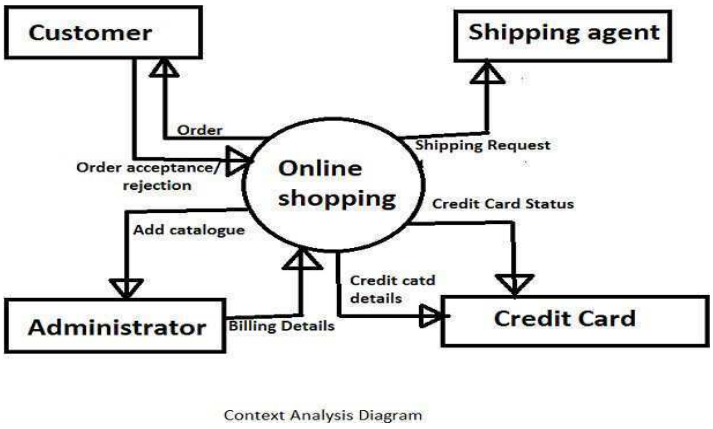
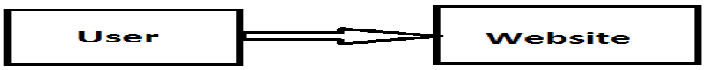


Figure 3.6: Data Flow Diagram

A Data Flow Diagram (DFD) is a structured analysis and design tool that can be used for flow charting. A DFD is a network that describes the flow of data and the processes that change or transform the data throughout a system. This network is constructed by using a set of symbols that do not imply any physical implementation. It has the purpose of clarifying system requirements and identifying major transformations. So it is the starting point of the design phase that functionally decomposes the requirements specifications down to the lowest level of detail. DFD can be considered to an abstraction of the logic of an information-oriented or a process-oriented system flow-chart. For these reasons DFDs are often referred to as logical data flow diagrams.

3.2.2.1 DFD Level 0 Diagram



g

Figure 3.2.2.1: DFD Level 0 Diagram

The above diagram shows the 0th level of DFD. Customer visit to website then administrator check the customer is valid or not if valid then he can purchase.The customer validation done through login module, the product else register first. When the order is given, first check the stock is available or not if available then the order is approved by administrator. Then at the payment he chooses the online payment or cash on delivery. The receipt will be send to customer and record will be store in the database.

3.2.2.2 DFD Level 1 Diagram

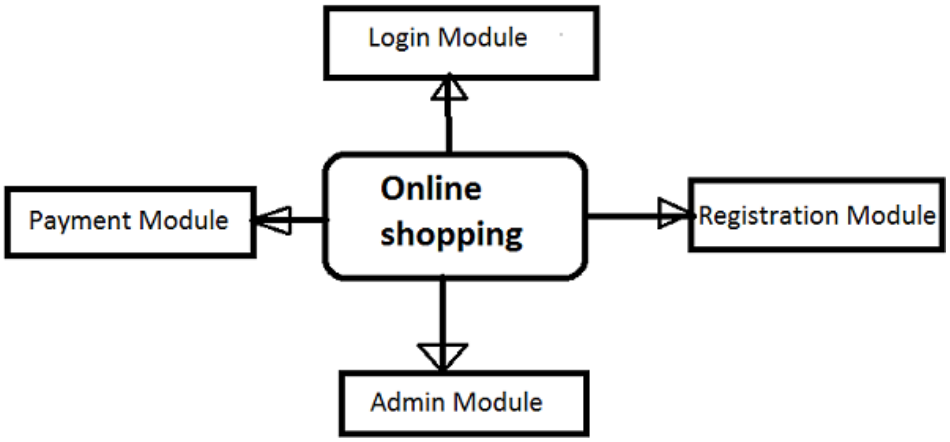


Figure 3.2.2.2: DFD Level 1 Diagram

The above diagram shows the first level of DFD. Customer visit to website then administrator check the customer is already existing or not if it is already existing then it gives valid access. Otherwise first he registers for website and then login through username and password. We can store the customer information like name, address, mobile no, email id etc. for the further communication.

EXTERNAL ENTITY

An external entity is a source or destination of a data flow. Only those entities which originate or receive data are represented on a data flow diagram. The symbol used is a rectangular box.

PROCESS

A process shows a transformation or manipulation of data flow within the system. The symbol used is an oval shape.

DATA FLOW

The data flow shows the flow of information from a source to its destination. Data flow is represented by a line, with arrowheads showing the direction of flow. Information always flows to or from a process and may be written, verbal or electronic. Each data flow may be referenced by the processes or data stores at its head and tail, or by a description of its contents.

DATA STORE

A data store is a holding place for information within the system: It is represented by an open ended narrow rectangle. Data stores may be long-term files such as sales ledgers, or may be short-term accumulations: for example, batches of documents that are waiting to be processed. Each data store should be given a reference followed by an arbitrary number.

3.3 Design and Test Steps / Criteria

A. General Test Cases

1. Verify that user is able to navigate through all the products across different categories.

2. Verify that all the links and banners are redirecting to correct product/category pages and none of the links are broken.

3. Verify that the company logo is clearly visible.

4. Verify that all the text - product, category name, price and product description are clearly visible.

5. Verify that all the images - product and banner are clearly visible.

6. Verify that category pages have relevant product listed specific to the category. 7. Verify that correct count of total products is listed on the category pages.

8. Search - Verify that on searching all the product satisfying the search criteria are visible on the search result page.

9. Search - Verify the more relevant product for the search term are displayed on the top for a particular search term.

10. Search - Verify that count of products is correctly displayed on the search result page for a particular search term.

11. Sorting - Verify that all the sort options work correctly - correctly sort the products based on the sort option chosen.

12. Sorting - Verify that sorting works correctly on the category pages.

13. Sorting - Verify that sorting works correctly on the search result page.

B. Product Buy Flow - Test cases

1. Verify that on the product page, user can select the desired attribute of the product e.g. size, color etc.

2. Verify that user can add to cart one or more products.

3. Verify that user can add products to add to cart.

4. Verify that user can buy products added to cart after signing in to the application (or as per the functionality of the website).

5. Verify that user can successfully buy more than one products that were added to his/her cart.

6. Verify that user cannot add more than available inventory of the product.

7. Verify that the limit to the number of products a user can by is working correctly by displaying error message and preventing user from buying more than the limit.

8. Verify that the delivery can be declined of for the places where shipping is not available.

9. Verify that Cash on Delivery option of payment is working fine.

10. Verify that the different prepaid methods of payments are working fine.

11. Verify that product return functionality works fine.

C. User Registration - Test cases

1. Verify that all the specified fields are present on the registration page.

2. Verify that the required/mandatory fields are marked with against the field.

3. Verify that for better user interface dropdowns, radio buttons and checkboxes etc. fields are displayed wherever possible instead of just textboxes.

4. Verify the page has both submit and cancel/reset buttons at the end.

5. Verify that clicking submit button after entering all the required fields, submits the data to the server.

6. Verify that clicking cancel/reset button after entering all the required fields, cancels the submit request and resets all the fields.

7. Verify that whenever possible validation should take place at client side.

8. Verify that not filling the mandatory fields and clicking submit button will lead to validation error.

9. Verify that not filling the optional fields and clicking submit button will still send data to server without any validation error.

10. Check validation on date and email fields (only valid dates and valid email Ids should be allowed).

11. Check validation on numeric fields by entering alphabets and special characters.

12. Verify that leading and trailing spaces are trimmed.

13. Verify that after making a request to the server and then sending the same request again with the same unique key will lead to server side validation error.

3.4 Testing Process

1. Testing E-commerce Applications Functionality

An e-commerce web or mobile application has four important elements in its structure, and they are:

• Main Pages: -

Homepage, Product page, Services, Social Awareness, About Us page, Contact Us page etc.

• Category / Product Type Pages: -

The product page consists of options such as description, product image, net wet, quantity and price. There is sorting feature to filter out products based on description, price, size, etc. There is also Add to Cart feature present in the category pages.

• Product Description Page: -

Consists of product title, description, product images, related products, Add to Cart feature, Product comparison, additional product info, etc.

• Shopping Cart: -

Products list view, removing product from the list, cash on delivery option, select delivery option, card payment, pay now option, etc.

2. **Testing E-commerce Application Workflow:** -

The testing of the complete workflow of your e-commerce web/mobile application consists of:

- Login and Signup options
- Search functionality
- Add/remove functionality in the shopping cart
- Check out process
- Order number and invoice generation

3. **Checking Compatibility with Web Browser: -**

It is important for e-commerce applications to work on all types of web browsers such as Google Chrome, Firefox, Opera, Internet Explorer, Safari, etc. You need to test the browser compatibility of the application to make sure that your customers are able to use your e-commerce website without any hassle.

4. **Testing for Mobile Responsiveness: -**

Nowadays, mobile devices are taking over desktop platforms in terms of internet usage and companies are taking mobile-first approach in their e-commerce applications. You need to test the responsive design of your application in mobile devices of various screen sizes.

5. **Other Common Things to be Tested: -**

There are other common things in your e-commerce application you need to test and they include website content, webpage format, website accessibility, cookies, social buttons, adding/deleting content, removing/adding links, web standards, analytics, and making changes to shipping settings

Chapter 4

METHODOLOGY/ TECHNIQUES USED

4.1 Development Tools

The entire development process has been subdivided into two: the front end development and the backend development. The front end comprises of the visually visible parts such as the home page, admin panel, contact page, shopping cart page. The back end contains the database and its interaction with the front-end.

1. Front End Development:

The front end was initially raw coded using JavaScript. JavaScript is a client side scripting language which is a dedicated language for web development. JavaScript code was simply mixed with the Hypertext Mark- up Language (HTML) code. Hypertext mark-up language is the language used to design the web pages of an application. A static page is an HTML document that is stored on the web server and does not change.

This was performed by Cascading Style Sheet (CSS). CSS is a style sheet language used for describing the look and for- matting a document written in a mark-up language. These CSS files are linked with the class files with ASP extensions to put the panels in order, the text with correct font, size and color. JavaScript is a client side scripting language most commonly used as part of web browsers and its implementations allow client side scripts to interact with the user, control the browser and alter the document content which is displayed.

For example, in website for the client's registration, the system asks to provide their details which contains their name, email address, age, etc. If they missed any of the details, then immediately the browser asks them to fill the 31 particular field. This is implemented and handled by a JavaScript. Bootstrap programs are also introduced in for web application which supports creation of animations.

2. Backend Development:

The Database Management System (DBMS) provides support for the back end. The database management system is essentially software where admin can create the database, add, drop, alter and update tables. The tables can hold different types of data for example: integer, variable characters etc. in our application we have chosen the MySQL DBMS to hold the database. MySQL is a relational database management system. The main reason is MySQL development project has made its source code available under the terms of the General Public License (GNU) which is an open source web application.

3. Database Design:

One of the most important and challenging task is the database design. The information passed by the customer while registering in the website is stored in the database. The products with their identification, description and image is stored in the database. Moreover, if admin update any of the featured products then update takes place in the database. So the program has a lot to do with the database.

Any query is run on the database by Structured Query Language (SQL). As stated earlier that PHP has some useful features one of them is the support to connect the database and run queries. The following diagram explains the details the database design [3].

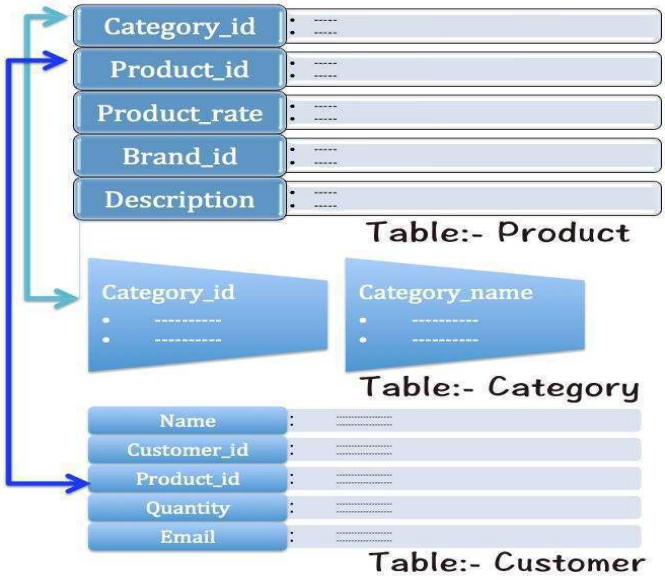
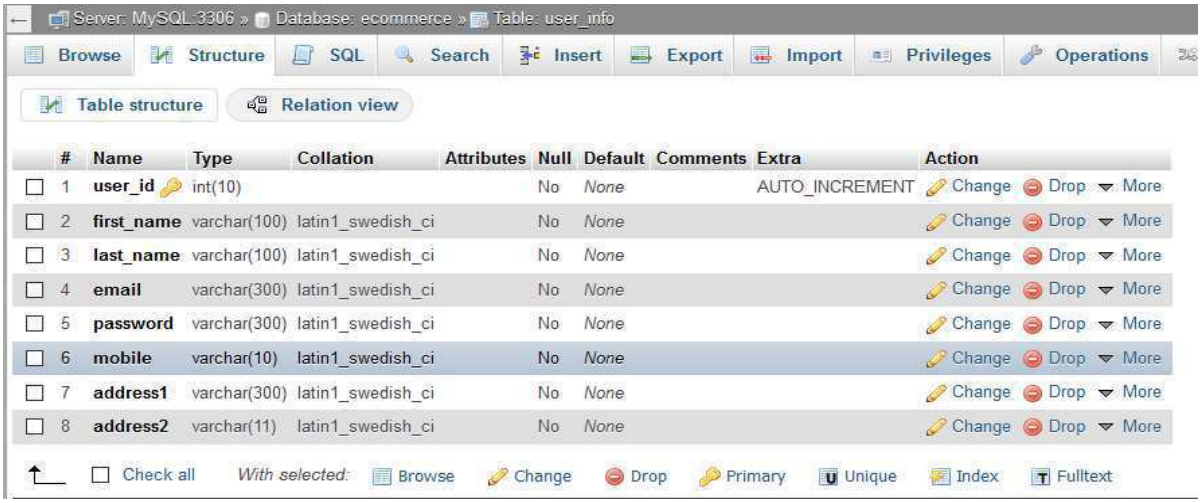


Figure 4.1: Database Tables of Products, Category and Customer

4.2 Database Schema

We are using fourteen tables for the database such that Admin, Admin information, Brands, Add to cart, Categories, Email information, Orders, Order information, Products, Logs, User information and Feedback.

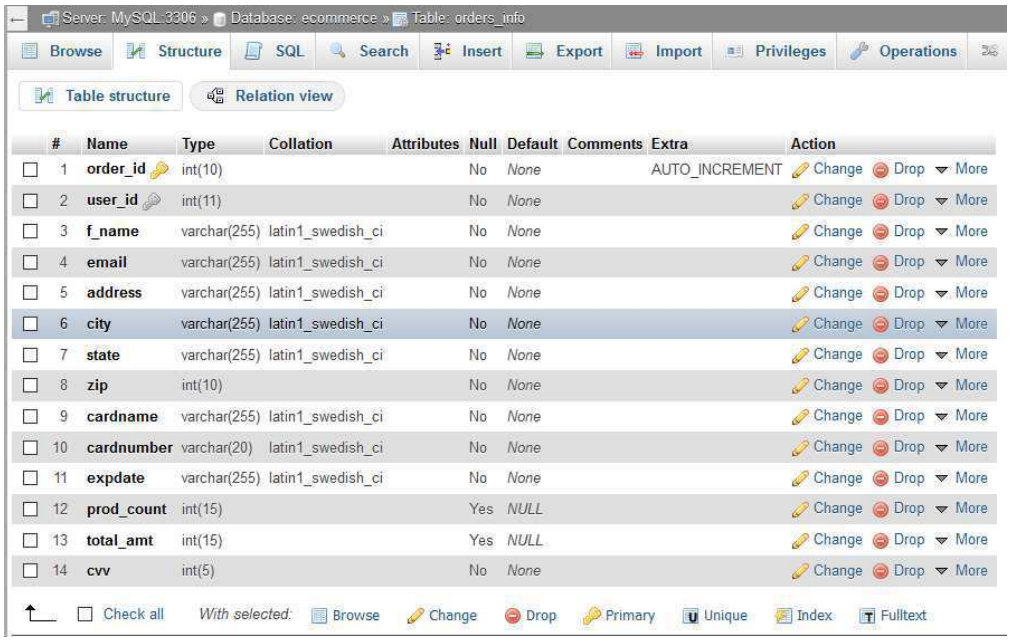
Table 4.1: User Registration



This is User Registration table. It includes eight columns like Uid, FirstName, LastName, MobileNo, Email id and Password, Address. The Uid is the primary key and it will be auto incremented. We can easily change the record as well as drop the record and perform many more operations.

If user want to purchase any product at that time user should register to our website. If user is already registered, then they can easily login to our portal with the credentials.

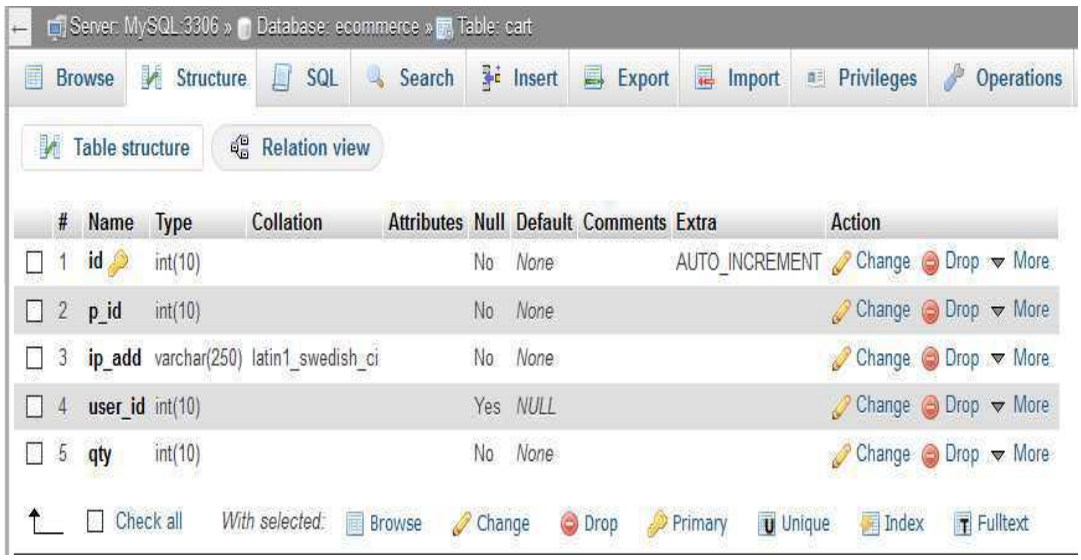
Table 4.2: Order Information



This is Order Information Table. It includes fourteen Columns like order id, user id, first name, email, address, city, state, zip code, card name, card number, expdate, product count, total count, cv number.

This order Information Table contain all the user information which is needed for buying the products. In this table order is the primary key and it will be auto incremented.

Table 4.3: Add to Cart



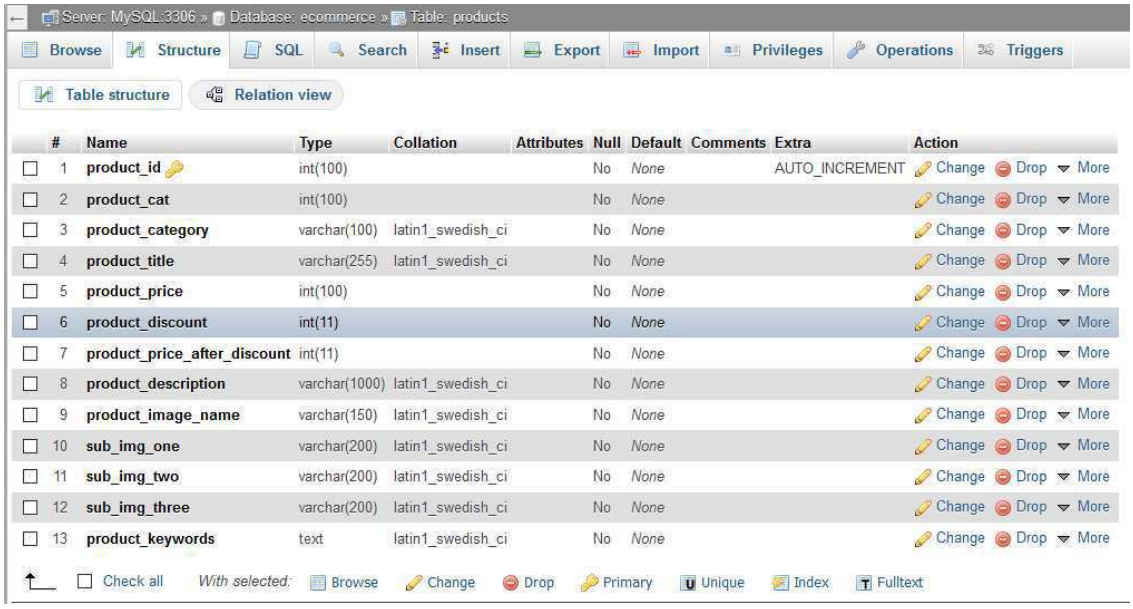
This is Add to Cart Table. It includes five columns like id, product id, ip add, user id, quantity. In this table id is the primary key and it will auto incremented. This table shows how many products you buy.

Table 4.4: Order products



This is Order Products Table. It include five columns like order product id, order id, product id, quantity, amount. Here in this table Order product is the primary key and it will be auto incremented.

Table 4.5: Products



This is Products Table. It include thirteen columns such that Product id, Product Category, Product title, Product Price, Product discount, Product price after discount, Product description, Product image, name, Sub image one, Sub image two, Sub image three, Product keyword.

In this table we can store the information of the products with their name, category, price, discount, product image.

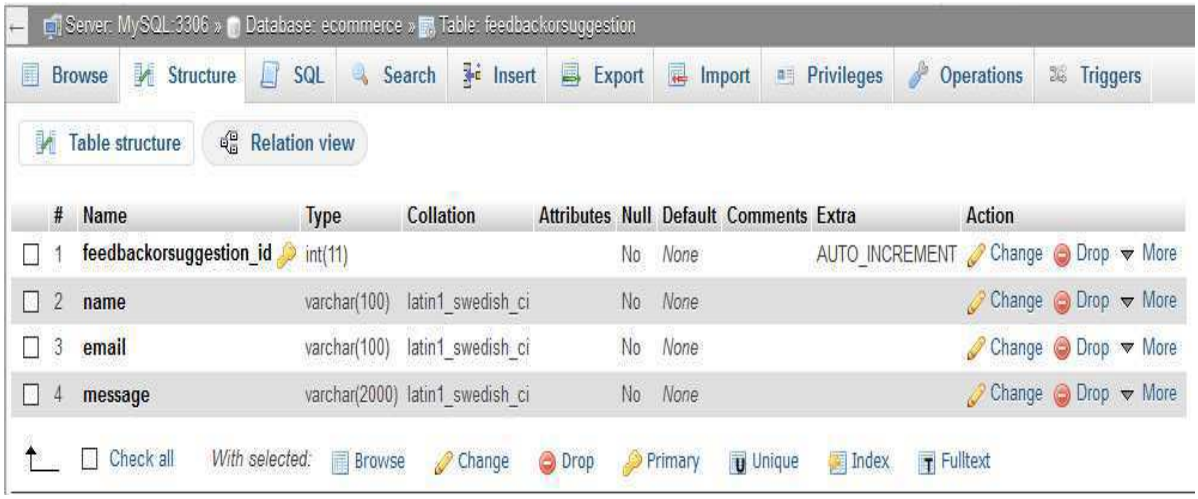


Table 4.6: Feedback Suggestion

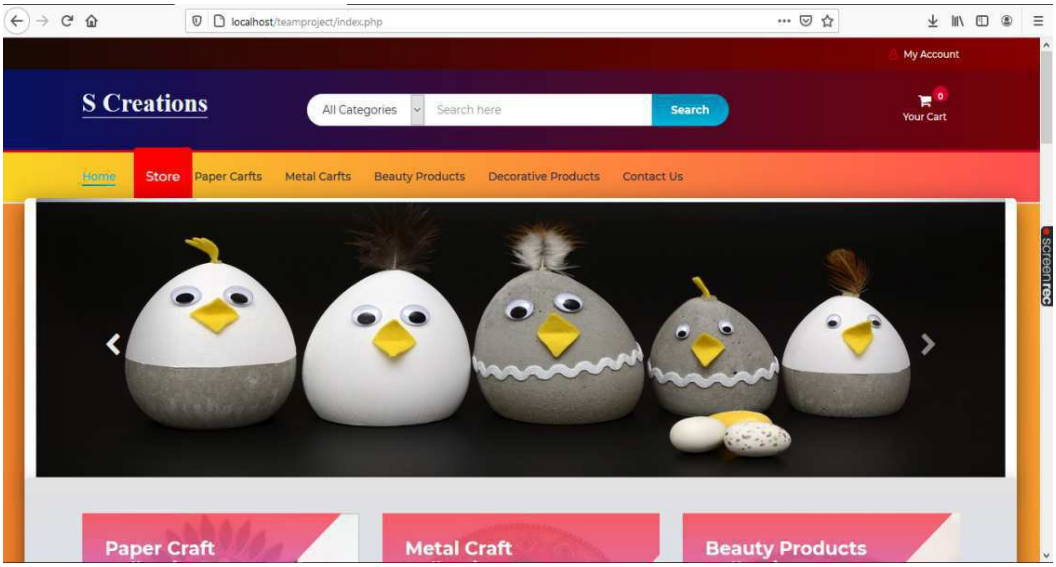
This is Feedback Suggestion table. It include four columns like Feedback Suggestion id, Name, Email, Message. Feedback Suggestion id is the primary key and it will be auto incremented.

In this table user to store the feedback given by the user with their name, email and message.

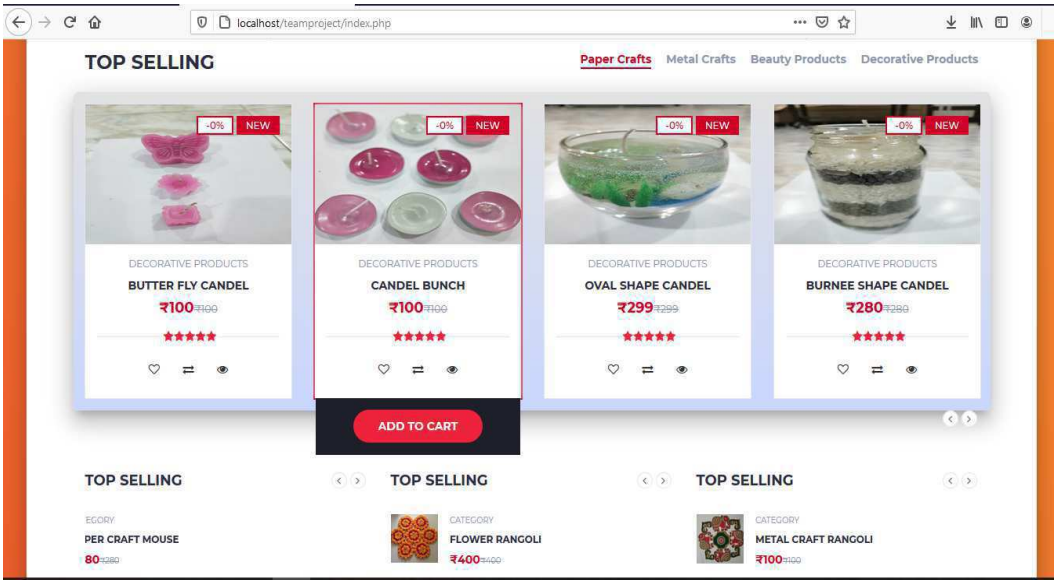
Chapter 5

EXPERIMENTAL RESULTS/OUTPUTS

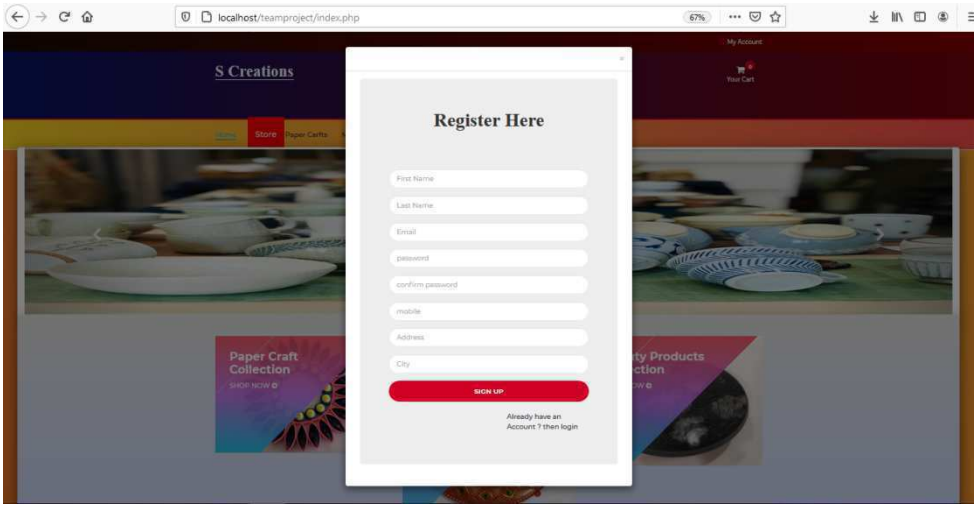
- **Home page**



- **Top Selling page**

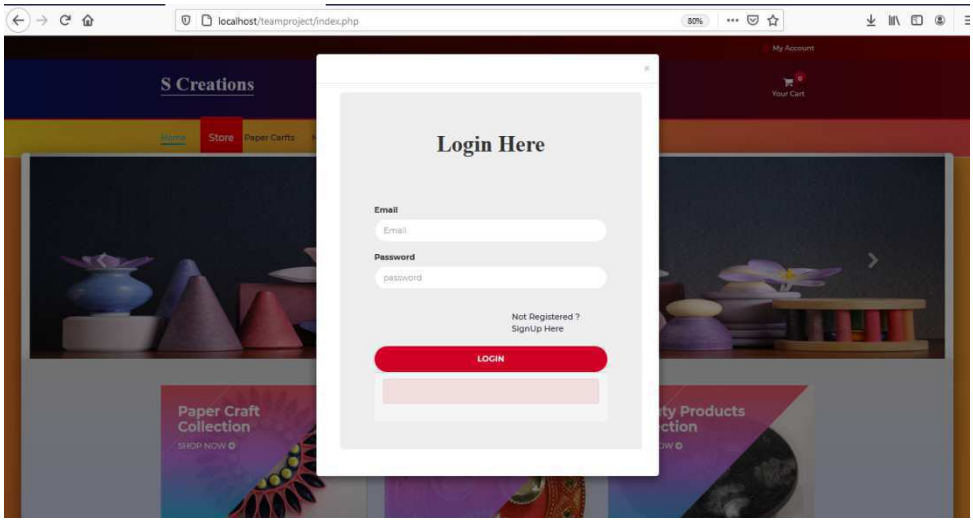


- **Register page**



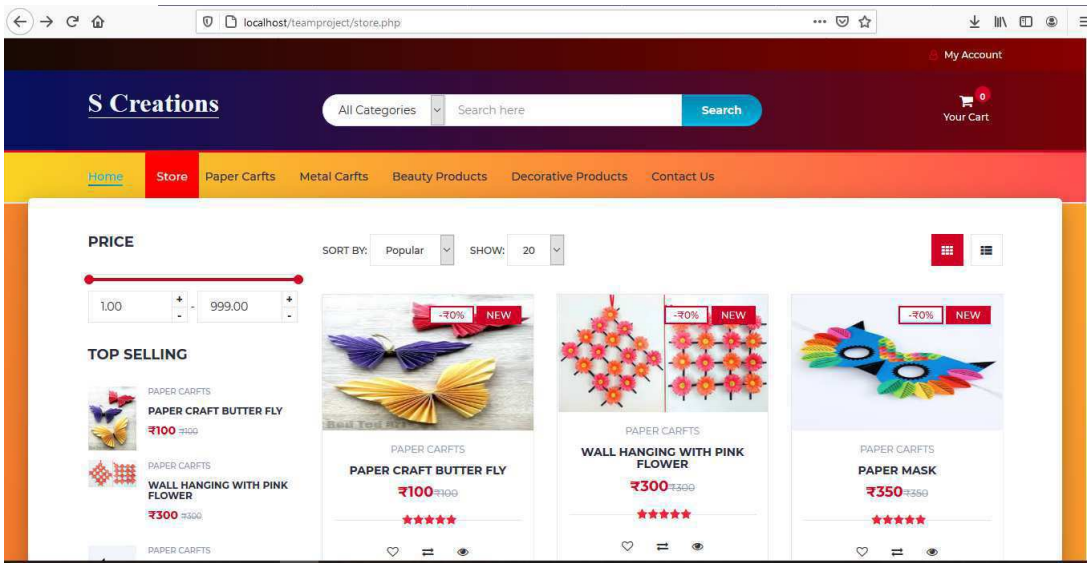
Here new user can register to get benefit from our websites. User can enter their details as mentioned in register form. User should enter their valid Email id because they will get notification on the registered Email Id. User should remember the email id and password during the registration for sign in next time.

- **Login page**

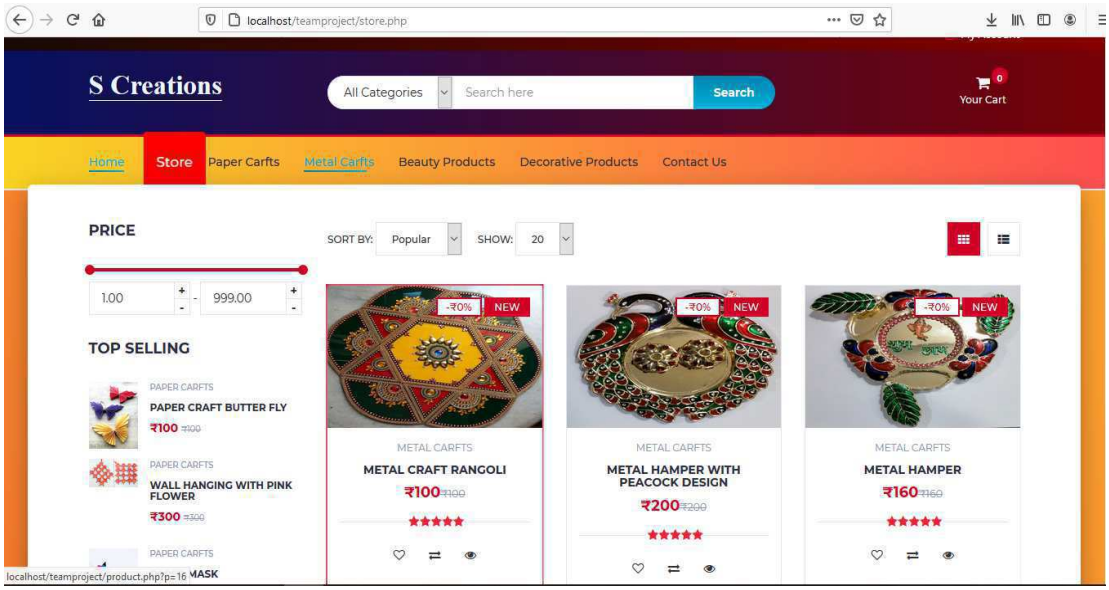


This is Login Page. Here user can enter their registered email id and pass- word. If the user enters invalid emailed or password, then couldn't sign in and the message will display on the screen Enter valid Email Id or Password.

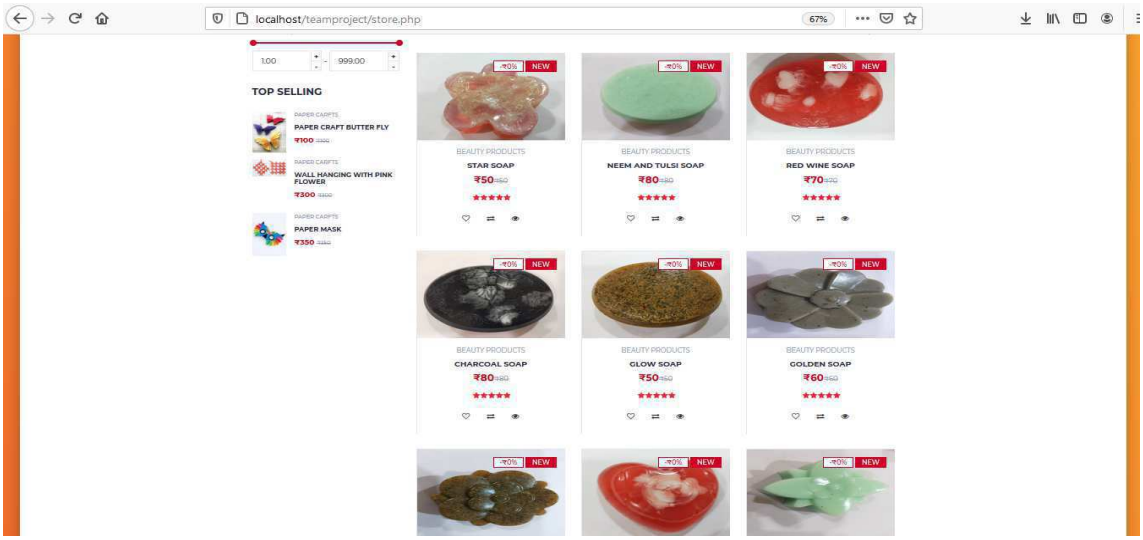
- **Paper craft page**



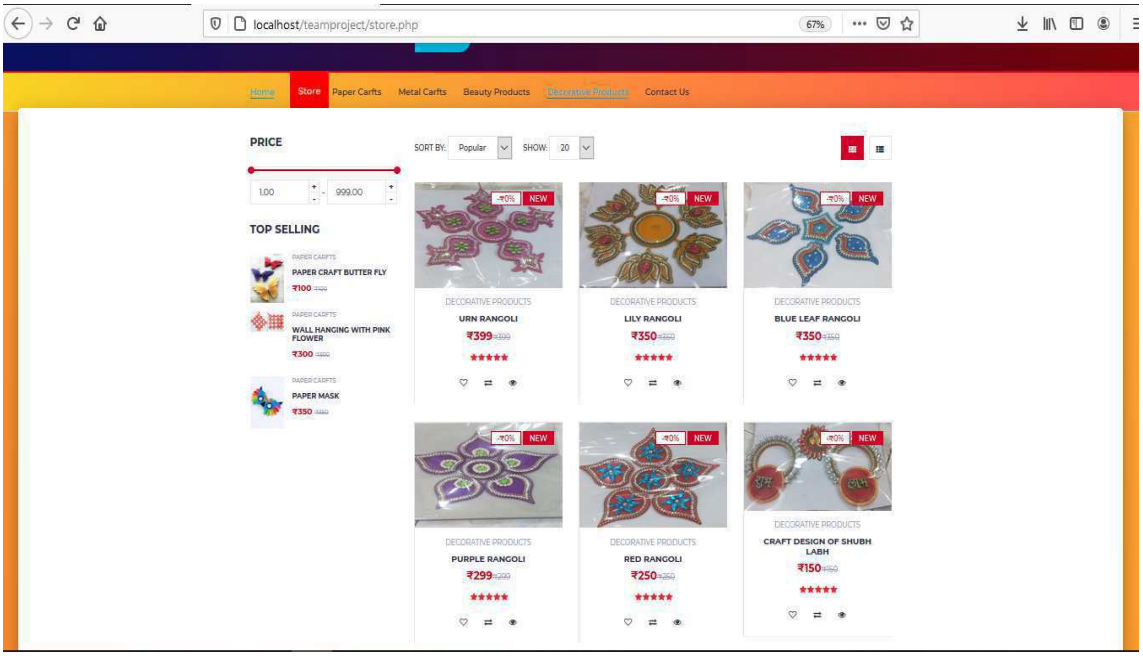
- **Metal Craft page**



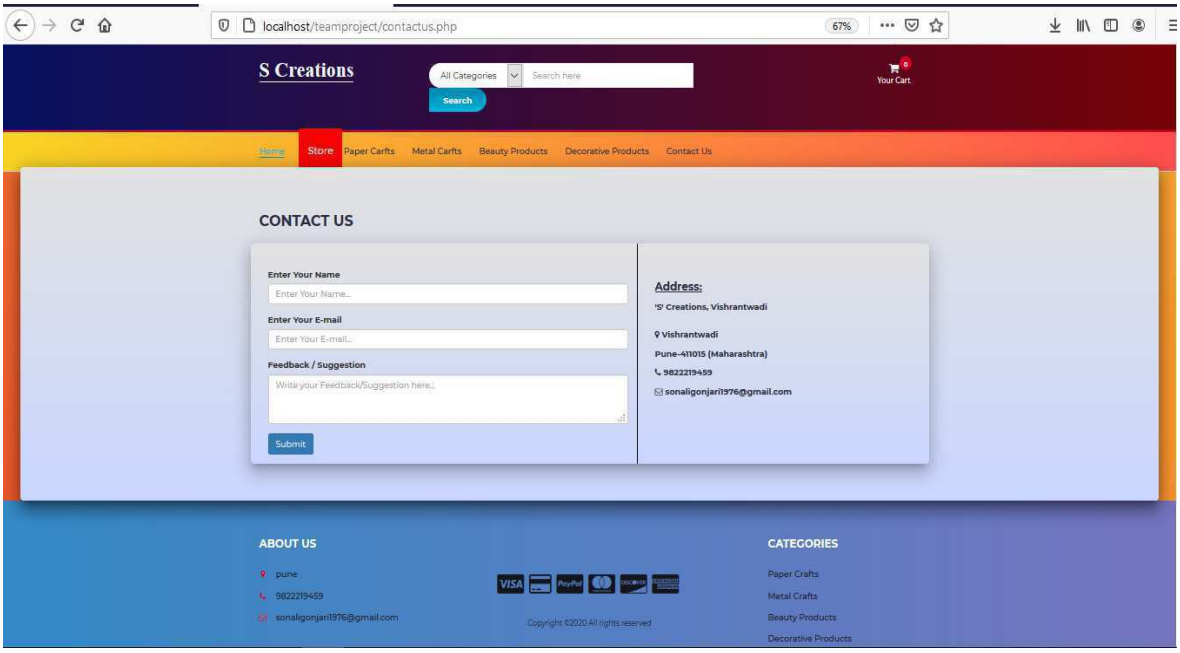
- **Beauty Products page**



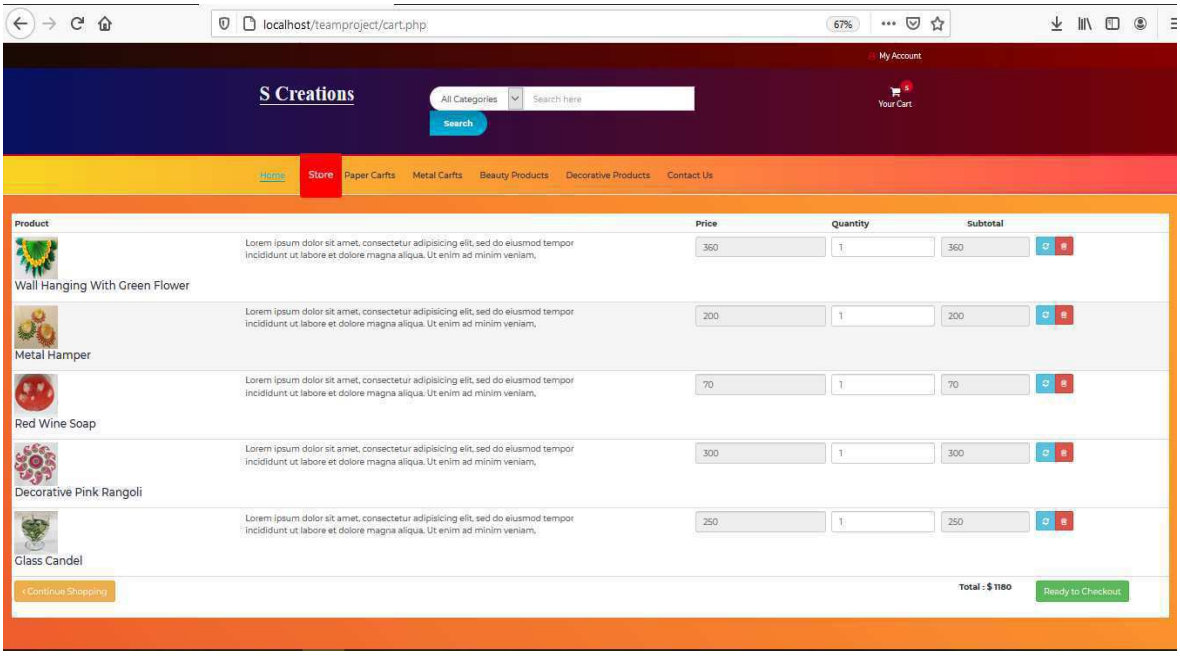
- **Decorative Products page**



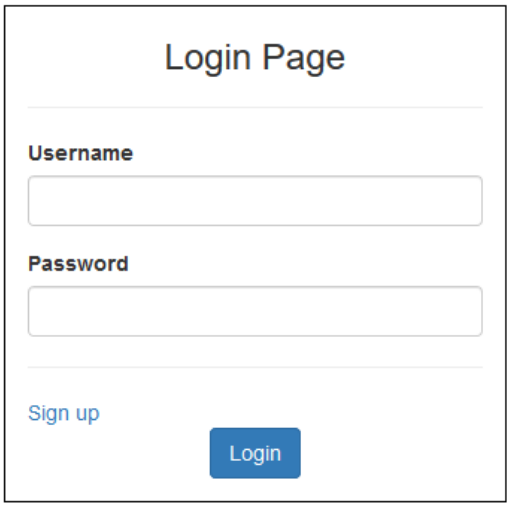
- **Contact Us page**



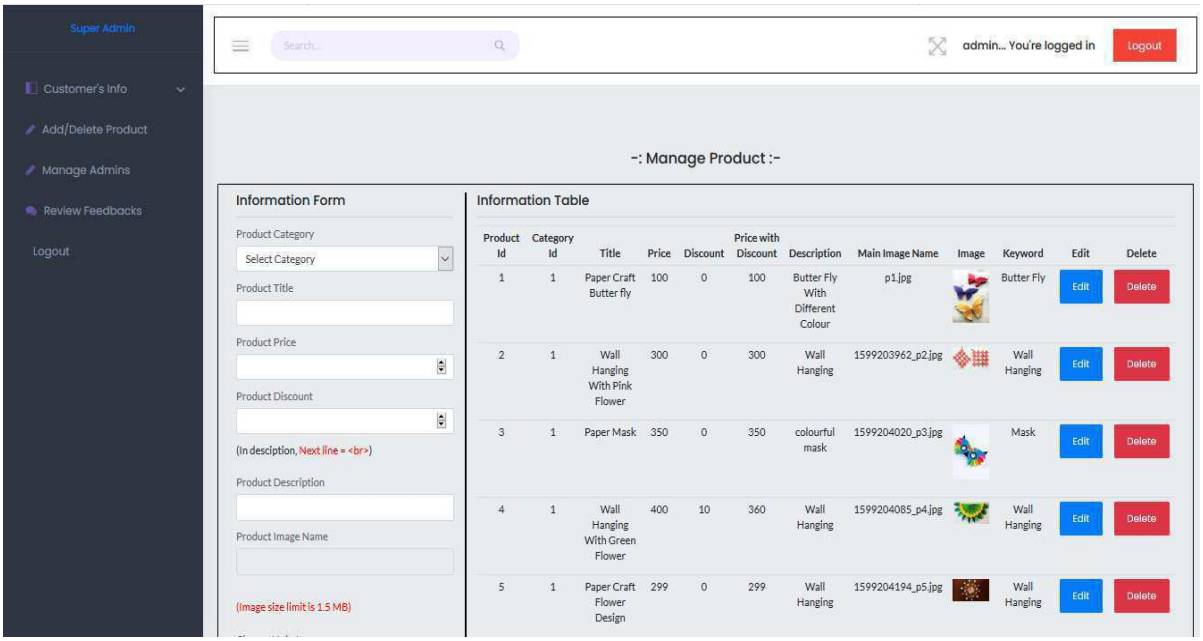
- **Add to Cart page**



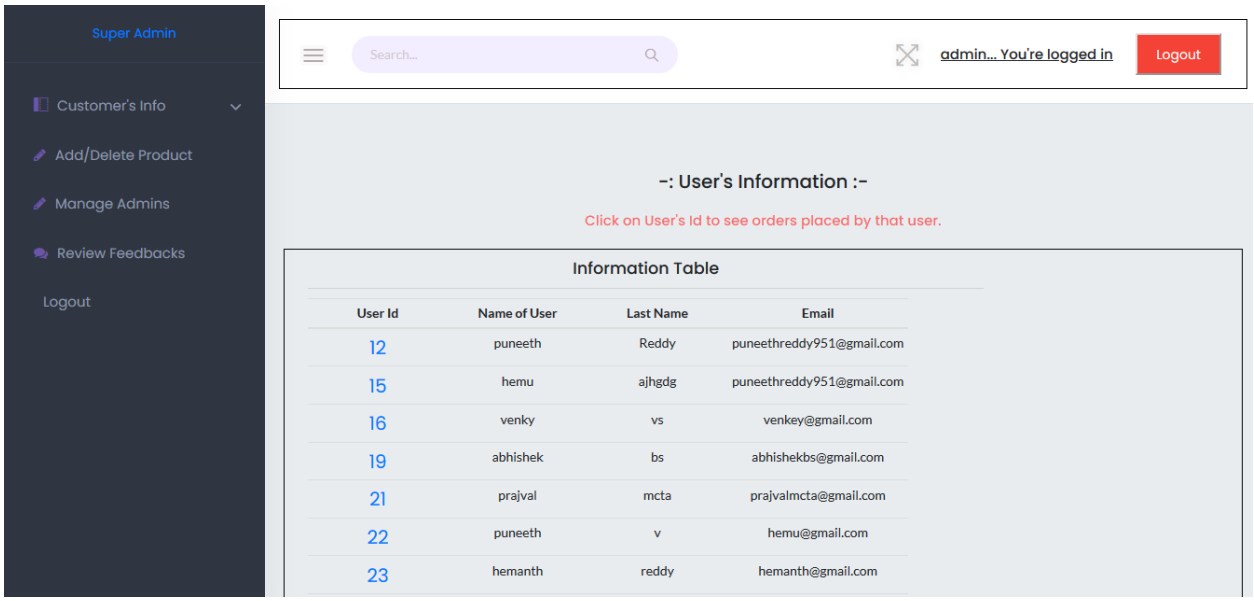
- **Admin Login Page**



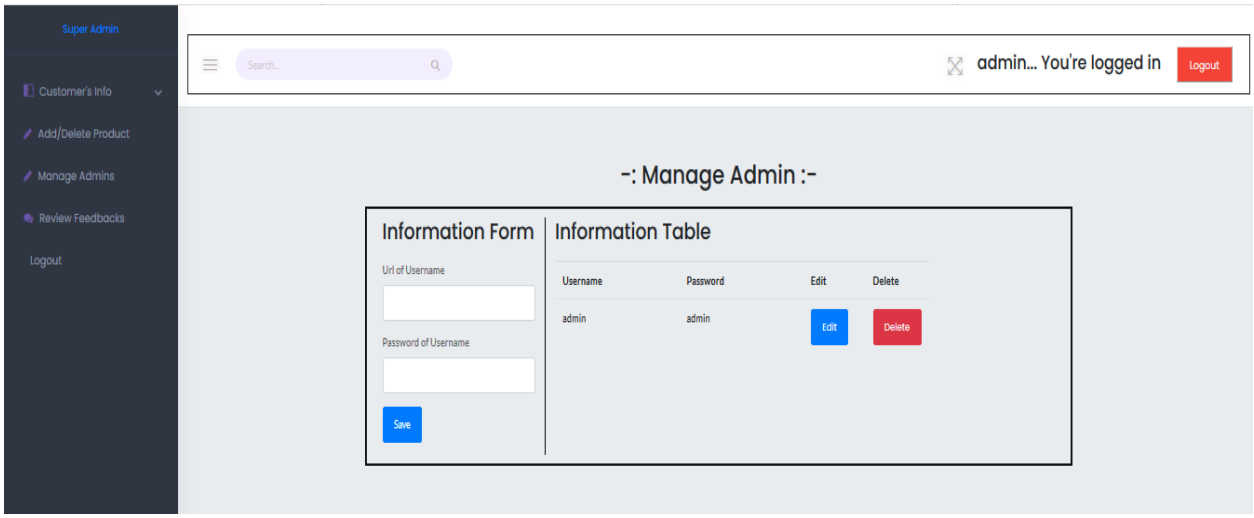
- **Admin Add/Delete Product Page**



- **Customer Information Page**



- **Manage Admin Page**



Chapter 6
CONCLUSIONS AND FUTURE SCOPE

CONCLUSION:

World Wide Web has become a major resource in modern business it gives new opportunities to business. An online website can be compared to a shops interior. The website is attractive, provides easy navigation, multiple options in terms of brands, color and design the customer would stay on the site. This website supports a flexible, attractive and an easy to use environment for an online website along with the addition feature like an off-site add to cart. This website provides an easier design to implement and provides easy navigation, on site and off site add to cart, and online payment. The off-site add to cart is a new feature proposed in this website.

FUTURE SCOPE:

Based on current website status following features will be considering for future enhancement.

1. Multiple shopping carts can be provided per user.
2. A mobile application for the website can be developed.
3. Payment through e-wallets could be made possible.
4. Send SMS alerts to the users.

References

[1] Ruvalcaba, Z. and Boehm, A., "Introduction to The Web Development in murachs HTML5 and CSS3", 1sted., Fresno, CA: Mike Murach and Associates, Inc., 2012, pp. 4–7.

[2] E.L.Thompson and S. D. Nowicki and T. Mayer, "Unified Modeling Languagein Professional PHP6", 2nd ed.,Indianapolis,Indiana: Wiley, 2010, pp. 3148.

[3] "The Design and implementation of E-Commerce site" by Swapna Kodali. [4] S. E. Ullah, T. Alauddin and H. U. Zaman, "Developing an E-commerce website", 2016 IEEE International Conference on Microelectronics, Computing and Communications (MicroCom), Durgapur, 2016, pp.1-4.

[5] "E-Commerce In India" by Abhishek, http://www.slideshare.net/

[6] Rohini V, Ancy Merlyn DSouza, Sachin Giriyappanavar, Sharun Mathew, "Shop- ping Application for E-Commerce", International Journal of Advance Com- puter Technology — Volume 4, Number 3

[7] Hong, W. and Zhu, K. Migrating to "internet-based e-commerce: Factors affecting ecommerce adoption and migration at the firm level, Information and Management", 43, 2006, pp. 204221.

[8] Lee, J. S. and Lin, K. S. A "robust e-commerce service: Light-weight secure mail-order mechanism, Electronic Commerce Research and Applications", 11, 2012, pp. 388396.

[9] Deng, L. and Poole, M. S. "Aesthetic design of e-commerce web pages Webpage Complexity, Order and preference, Electronic Commerce Research and Applications", 11, 2012, pp. 420440.

[10] Mitrevski, P. J. and Hristoski, I. S. "Behavioral-based performability modeling and evaluation of e-commerce systems, Electronic Commerce Research and Applications", 13, 2014, pp. 320340. 56

[11] Burt, S. and Sparks, "L. E-commerce and the retail process: a review, Journal of Retailing and Consumer Services", 10, 2003, pp. 275286.

[12] Crespo, A. H. and Bosque, I. R. “The influence of the commercial features of the Internet on the adoption of e-commerce by consumers, Electronic Commerce Research and Applications”, 9, 2010, 562575.

[13] Atif, Y. A “Distributed and interoperable object-oriented support for safe ecommerce transactions, Information and Software Technology”, 46, pp. 2004, 149164.

[14] Takashi Endo, Hiroshi Suzuki, Haruo Hayami “Development of a website for posting paper craft making after workshop ” published by IEEE on 7-9 Jan 2018.

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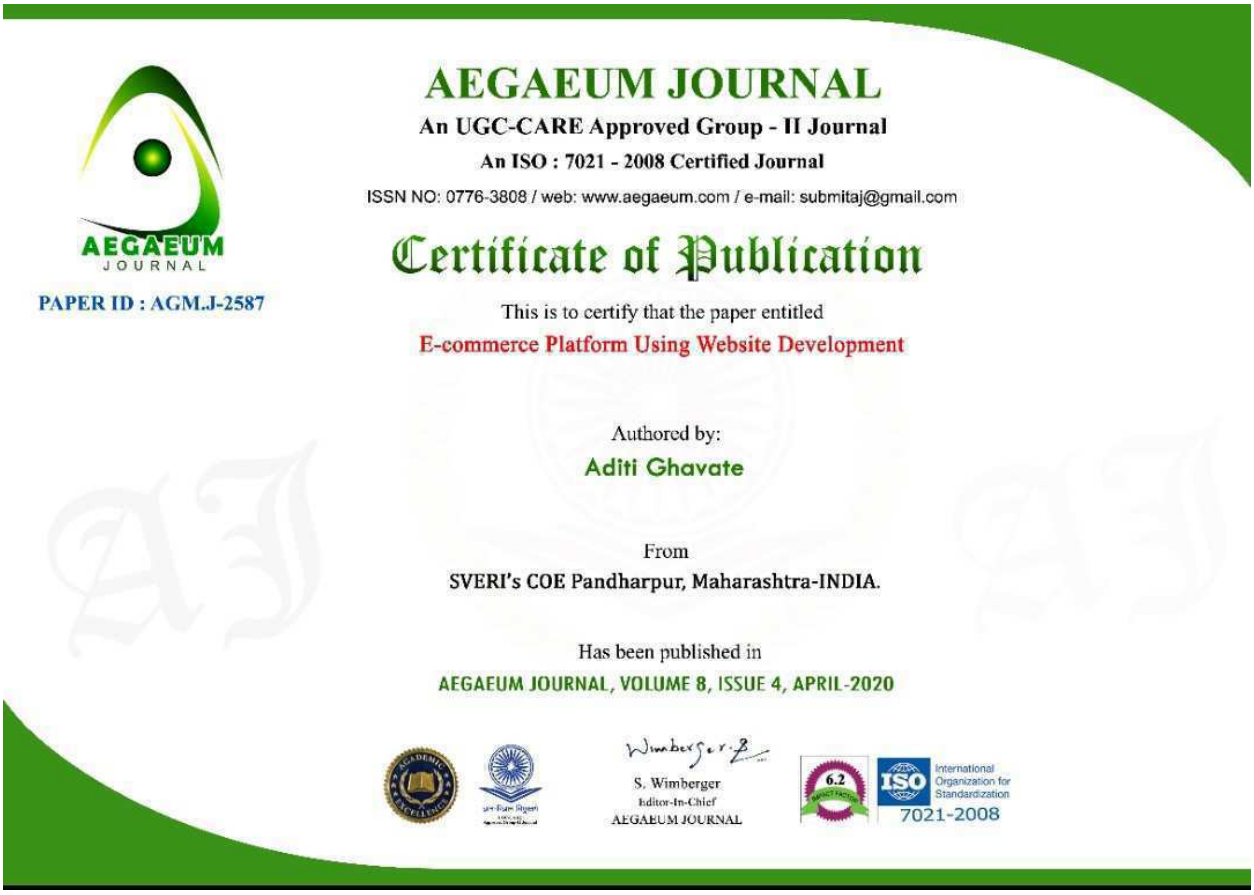

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E-commerce Platform Using Website Development

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SVERI's COE Pandharpur, Maharashtra-INDIA.

Has been published in

AEGAEUM JOURNAL, VOLUME 8, ISSUE 4, APRIL-2020

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E-commerce Platform Using Website Development

Authored by:

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From

SVERI's COE Pandharpur, Maharashtra-INDIA.

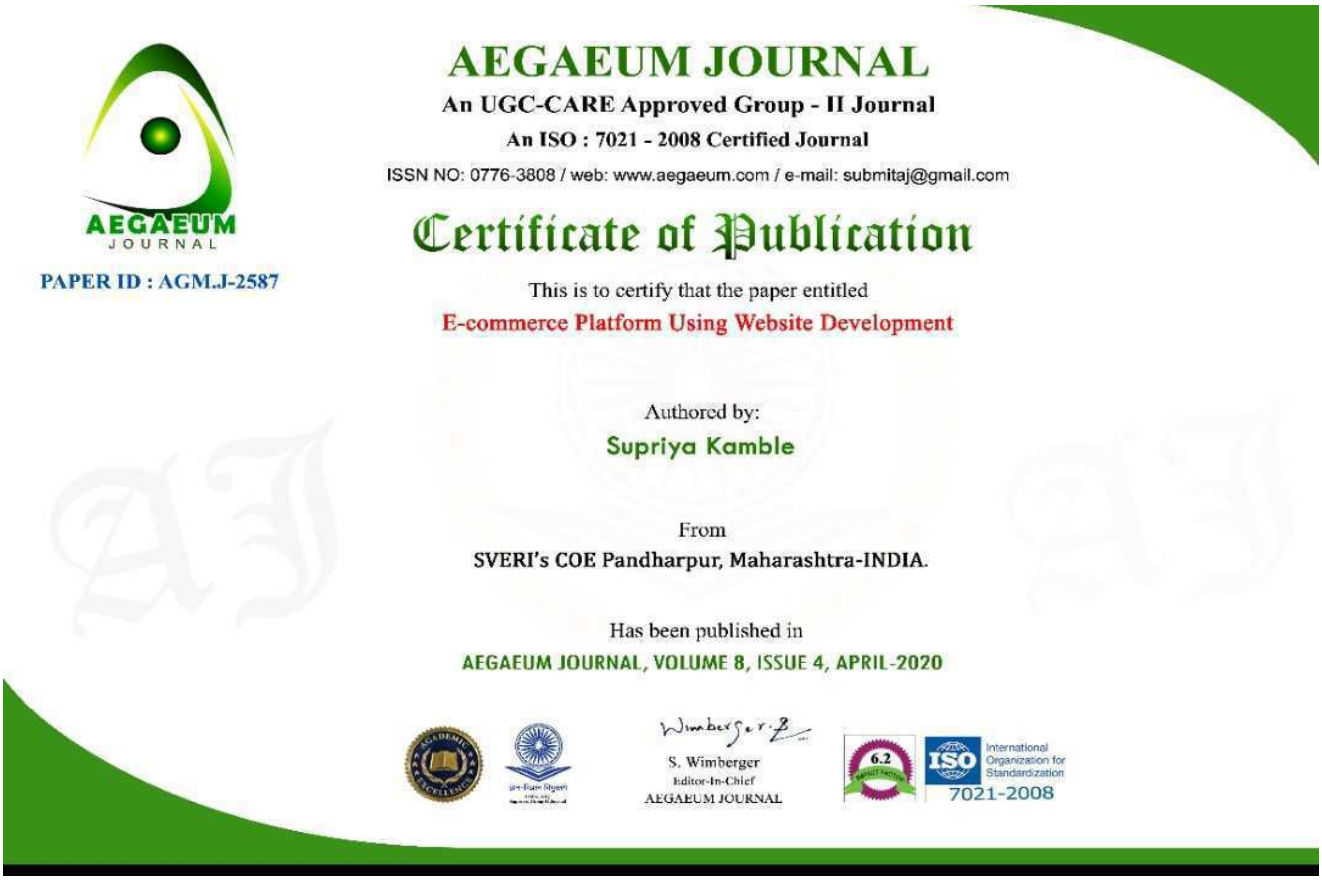
Has been published in

AEGAEUM JOURNAL, VOLUME 8, ISSUE 4, APRIL-2020

S. Wimberger
Editor-In-Chief
AEGAEUM JOURNAL

6.2

ISO International Organization for Standardization 7021-2008



AEGAEUM JOURNAL
An UGC-CARE Approved Group - II Journal
An ISO : 7021 - 2008 Certified Journal
ISSN NO: 0776-3808 / web: www.aegaeum.com / e-mail: submitaj@gmail.com

AEGAEUM JOURNAL

PAPER ID : AGM.J-2587

Certificate of Publication

This is to certify that the paper entitled

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E-commerce Platform Using Website Development

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Abstract:

E-commerce website is totally related with the selling and marketing of the craft products. This is a small scale project for Online homemade craft / shopping system. The basic idea is that providing service to customers for buying products using online system. The Online homemade craft Shopping system enables vendors to set up online products with sections. We are providing the products section wise. So the customers can browse through the sections. The aim of this project is on the online shopping application it is developed using HTML5, Java script, CSS, PHP. The agenda is designing an online shopping site to manage the items in the shop and also help customers purchase them online without having to visit the shop physically. Our online shopping system will use the internet as the sole method for selling items to its consumers. Shopping will be highly personalized and the system will provide lower prices than most competitors. It is an online store that enables website owners to sell their product online. It is a web shopping cart that web enables the day-day sales functions. It includes product and customer management modules. This website will be
useful to anyone who wants to purchase items using internet. We are going to store the data in our database. So that
in case of any query it will be easily retrieved.

Keywords:- *E-Commerce, Service etc.*

1. INTRODUCTION

The internet is the way that helps a person in all aspects. In today's world, people don't have time for their personal needs. The innovation is fast to the point that anybody can do anything by simply sitting in a room. So, it is an imperative issue as per observation. In the event that somebody wish to purchase and view things, they can purchase online with the assistance of web. Commercial centres like Flipkart, Amazon and Snapdeal are giving gigantic chances to youthful understudies, housewives just as little shop proprietors to scale their organizations and win great cash [1][13]. Not with standing, there are different variables that one needs to take a gander at before beginning up an online business. Setting up an online shop to move your items can be a valuable and beneficial method for working together.

Web based moving can likewise widen your client base, as you can pitch to individuals who are interstate or abroad. It enables you to work without fundamentally requiring a conventional shop front and gives your clients greater adaptability since they can purchase your items whenever of the day. Internet shopping doesn't speak to everybody, so ensure your objective market is OK with purchasing on the web before you begin. You may discover you can achieve more clients by offering web based shopping close by a customary shop. Web based shopping makes utilization of advanced innovation for dealing with the stream of data, items, and instalment between shopper, website proprietors and providers.

In the event that you were move your item disconnected, at that point you will ready to move your items in constrained region where your shop is found, however when you are going to move your items online then you can move the items in various locales. For this situation, your benefit will be naturally expanded. Presently multi day everybody is occupied with their work they didn't get time for buying the items by going to specific shop, with the assistance of online commercial [5] centres they will spare their profitable time just as they will ready to see clients audit and contrast and the results of different merchants [6].

Online stores offer item depiction, pictures, correlations, cost and significantly more. The clients get limits through which they can spare their cash. Labour additionally diminishes because of online commercial center. Shopping basket is one of the essential office gave in web based shopping, this lets client to peruse distinctive products and enterprises and once they select a thing to buy they can put the thing in shopping basket, and keep perusing till the last choice [12].

2. RESEARCH METHODOLOGY

The proposed application is implemented using HTML5, CSS, Java script and PHP[4]. The currently working e-commerce shopping websites provide the features of a sophisticated shopping cart, on-site wish list. This paper proposed an e-commerce shopping website to sell and promote only the Indian products.

Modular Design

The functionality of the proposed application is divided into number of sub modules. The modules to be taken into account are customer shopping cart module, orders, payment and product module. These modules are integrated together give the functionality desired out of the application.

Customer

This information includes giving username and password to login to this site. This is required to verify the user. In this module the client information is processed. The email id of the customer is used to confirm the customers orders and also to send promotional emails[10].

Order

In this module customer order is processed. The user can place the order for the items they wants to buy. It verifies the pin code and it confirms the order to delivered place. At the shipping address the product should be delivered.

Shopping Cart

This sub-module lets the user to select the items that they intends to buy to store in cart before placing the order. The items can be stored into the cart and it can be deleted from the cart.

Payment

In this sub module payment options for the order is given and processed. Payment would be through credit card, debit card, E-cash or cash on delivery. The total charges of the product is the sum of cost of the product and delivery charges will be deducted from the user's account in case of payment options other than cash on delivery.

Product

In this module product details can be added to the created database. The tax per product and actual price of the products can be added as per the standard policy. The product details can be edited. The database is normalized [13] so that the redundancy is minimized.

The database for the proposed web-application is normalized up to third normal form.

The products are stored as per category. Arrangement of products into categories enables the user to search the products based on its category effectively.

DEVELOPMENT TOOLS

The entire development process has been subdivided into two: the front end development and the backend development. The front end comprises of the visually visible parts such as the home page, contact page, admin panel, shopping cart page. The back end contains the database and its interaction with the front-end.

A. Front End Development

The front end was initially raw coded using JavaScript. JavaScript is a client side scripting language which is a dedicated language for web development. JavaScript code was simply mixed with the Hypertext Mark-up Language (HTML5) code. A static page is an HTML5 document that is stored on the web server and does not change. Hypertext mark-up language is the language used to design the web pages of an application.

Cascading Style Sheet (CSS) is a style sheet language used for describing the look and formatting a document written in a mark-up language. These CSS files are linked with the class files with .php extensions to put the panels in order, the text with correct font, size and color. JavaScript is a client side scripting language most commonly used as part of web browsers and

its implementations allow client side scripts to interact with the user, control the browser and alter the document content which is displayed.

For example, in website for the clients registration, the system ask to provide their details which contains their name, email address, mobile number, etc. If they missed any of the details then immediately the browser asks them to fill the particular field. This is implemented & handled by a JavaScript.

B. Backend Development

The Database Management System (DBMS) provides support for the back end. The database management system is essentially software where admin can create the database, add, drop, alter and update tables. The tables can hold different types of data for example: integer, variable characters etc. in our application we have chosen the MySQL DBMS to hold the database. MySQL is a relational database management system. The main reason is MySQL development project has made its source code available under the terms of the General Public License (GNU) which is an open source web application.

C. Database Design

The information provided by the customer while registering in the website is stored in the database. The products with their identification, description and image is stored in the database. Moreover, if admin update any of the featured products then update takes place in the database. So the program has a lot to do with the database.

Any query is run on the database by Structured Query Language (SQL). As stated earlier that PHP has some useful features one of them is the support to connect the database and run queries. The following diagram explains the details the database design [3].

The system have six tables in the database namely: advertise, brand, category, product, small_add and registration. The formation of three tables are shown in the diagram. The table entitled “product” has the attributes namely:product_id, product_rate, category_id, brand_id, and product_rate. Where product_id is the primary key for this table i.e. each product will have a unique identity.

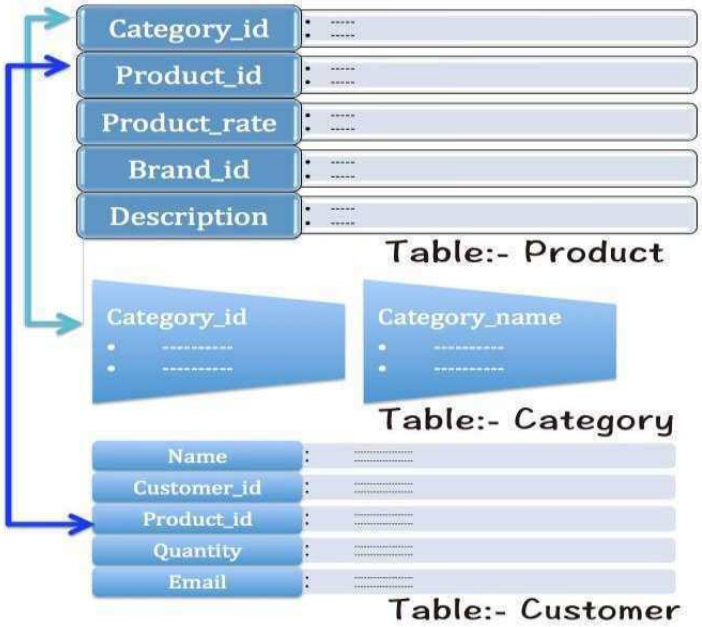

Fig. 1 . Database Tables of product, category and customer database.

The attribute category_id plays as a foreign key for this table *i.e.* this foreign key creates a link with table category having two attributes: website his information will be stored in the customer table with the attributes- name, customer_id, product_id, quantity and email. Again customer_id is the unique key for this table and prduct_id is the foreign key to link with the product table.

3. SYSTEM ARCHITECTURE

The Data Flow Diagram for the current web-application system. Each process within the system is first shown as a Context Level DFD and later as a detailed DFD. The context level DFD provides a conceptual view of the process and its surrounding input, output and data stores. The detailed DFD provides a more detailed and comprehensive view of the interaction among the sub-processes within the system.

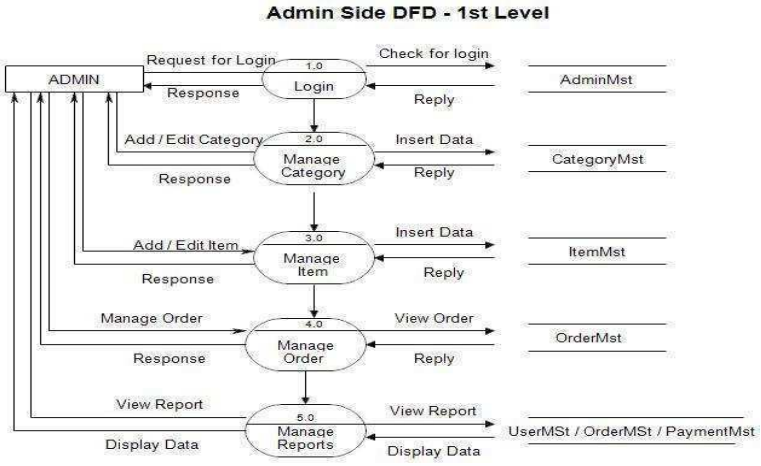

Fig 2. System Structure of Admin

The Admin side DFD [2][3] describe the functionality of Admin. Admin is an owner of the website. After login to the admin panel then admin can manage category, manage item, manage order, manage report, admin can add and delete item. Admin can add category of item and then add items by category wise and admin can manage order and payment detail.

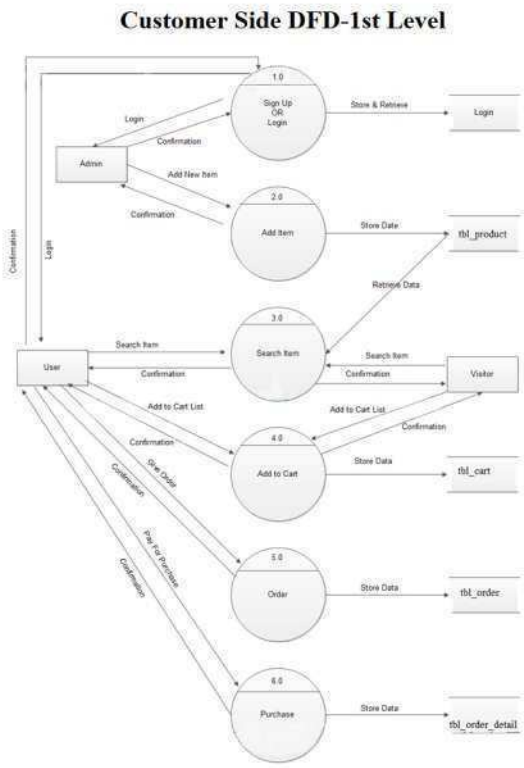

Fig 3. System Structure of User

Customer select the product as per their requirements specification, description. The Customer side DFD describe the functionality of Customer. Customer should login with correct credentials. Then it should place the order through the payments. Customer can pay the payment through net banking credit card, debit card and cash on delivery.

4. IMPLEMENTATION

The website design in this paper needs a web browser and a database for implementation at the server side and only a web browser at the client side. The user types the URL corresponding to the website in the address field of the browser, a web server is contacted to get the requested information. Web server accepts the incoming HTTP requests and returns the requested information in an HTTP response. The application is developed using HTML5 as, and MYSQL workbench as the backend.

Integrating the website and the database:

Admin should be able to keep track of the all products ordered, payment details, customer inquiries. So a well organized database is very essential for maintenance of an ecommerce web-application. Customers ordering the products from an e-commerce website should be able to get the information of products, ask questions, review, and give feedback on the products. Also, they can select the products they would like to buy, submit payments. The user must be able to access the database and for this the remote database connectivity is established. The user information is stored in and retrieved from the remote database. The database used in this application is MYSQL Server.

Webpage design:

The web pages are designed in HTML5 and Java Script [8][9]. The web pages should be dynamic in nature as the user should be able to access the product details, make payment, post feedback, etc. The static web pages are used for displaying the product description, privacy policy and so on.

Working:

The administrator includes new items, settles on the ideas on certain items. The items that are not sought after can be for all time erased from the database which implies that the closeout of those items on the site is ceased. The administrator is given the benefits to change and refresh the database. The seller subtleties, installments to the merchant are to be taken consideration by the administrator. The administrator can choose the money down office to make accessible in all territories or limit to certain regions as it were. The transportation subtleties, for example, the regions where the delivery offices are accessible, the subtleties of the delivery organizations and the exchange between them are to be checked. The reports of the regular deal, benefit, the items are very on interest, etc are produced according to the demand. The report age isn't feasible for the client. A client suspected to have broken the protection strategy can be hindered by the administrator. The customer accesses the website by typing the URL corresponding to the website as shown in Fig. 4. The user can request for product details by clicking the products menu. The user is provided with two types of Add to Cart – onsite add to cart and offsite add to cart. In the add to cart the user is allowed to add any product available on the site to the list.

Promotional mails can be sent to the customers e-mail id based on their address. The heuristics analysis is to be made on a particular customer to know there interests. So that only on those products, the promotional notifications through mail can be sent to that customer.

The customer should sign up for the first time to place order of a product. Later each time user to buy products he should login. The add to cart of the user can be maintained if and only if the user has an account in the database. The product that user want to buy will be added to the cart, and if user to see some more products he can continue while one or more products are on the cart. The order of the products is placed from the cart as shown in Fig. 5. The products in the cart can be removed, more products can be added to the existing.

Once the order is placed the next step would be to give the order details as shown in Fig. 6. The user is asked to type his address, mobile number and pin code. Pin code is used to check the availability of the shipping service to given place. The next step is payment. The payment can be done through credit card, debit card, pay pal and cash on delivery. If the user want to make the payment via credit card or debit card, then the card details are asked. Once the user enters the card details the user is directed to a payment gateway for the transaction. Once the order is placed then mail will be send to the user. The user is informed via e-mail while the order is processed, shipped, and delivered at the destination.

The user will be given an order id which will help in tracking the order. The order can be cancelled before it is being shipped. The return policy is specified by the admin. The recently viewed products are displayed on the user's home page. The user can assign rating to products, review the products and give feedback. The purchase history of the user is maintained.

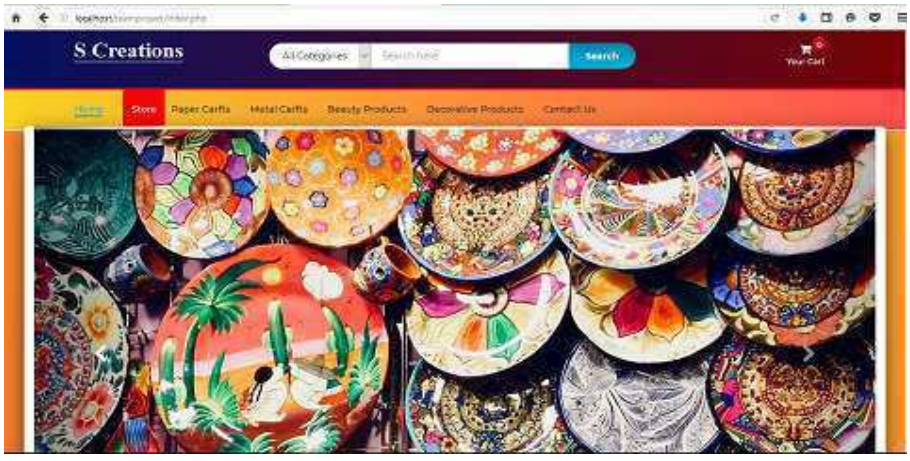

Fig. 4 . Home Page of Website.

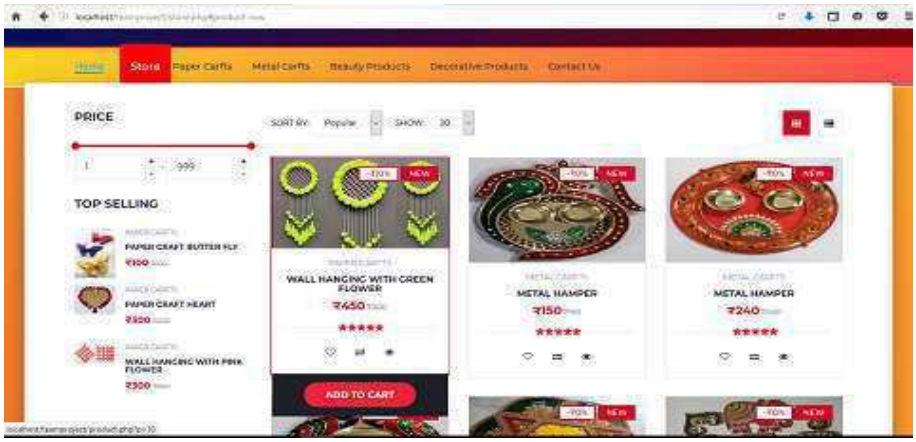

Fig. 5 . Product Details.

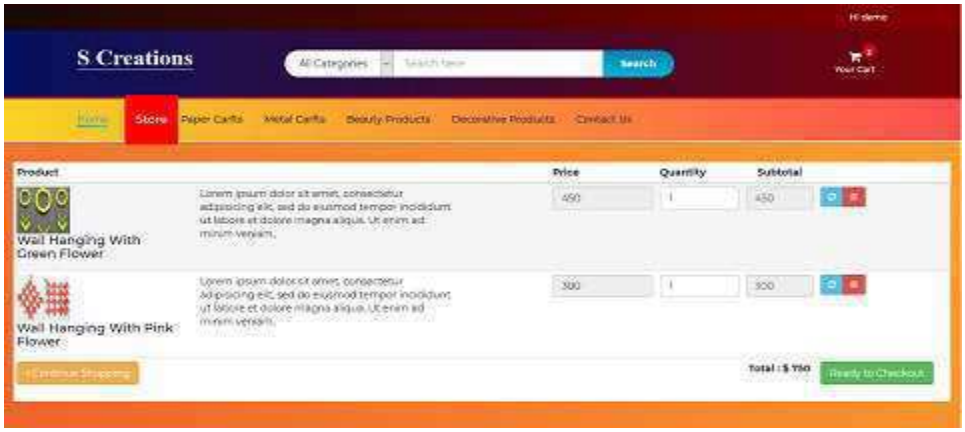

Fig. 6 . Add to cart from.

5. CONCLUSION

Online shopping is the process whereby consumers directly buy product services from seller in real time, without any intermediary service. Over an internet. World Wide Web has become a major resource in modern business. It gives new opportunities to business. An online website can be compared to a traditional shop's interior. The website is attractive, provides easy way for navigation, multiple options in terms of brands, color and design the customer would stay on the site. This paper supports a flexible, attractive and an easy to use environment for an online website application along with the addition feature like an offsite add to cart. Hence as future enhancements to the proposed system the following features.

1. Payment through e-wallets could be made possible.
2. Multiple shopping carts can be provided per user.

REFERENCES

[1] Ruvalcaba, Z., & Boehm, A., "*Introduction To The Web Development*" in murach's HTML5 and CSS3, 1sted., Fresno, CA: Mike Murach and Associates, Inc., 2012, pp. 4--7.

[2] E.L.Thompson & S. D. Nowicki& T. Mayer,"*Unified Modeling Language*"in Professional PHP6, 2nd ed.,Indianapolis,Indiana: Wiley, 2010, pp. 31–48.

[3] S. E. Ullah, T. Alauddin and H. U. Zaman, "*Developing an E-commerce website*", 2016 IEEE International Conference on Microelectronics, Computing and Communications (MicroCom), Durgapur, 2016, pp.1-4.

[4] E-Commerce In India by Abhishek, http://www.slideshare.net/

[5] Mitrevski, P. J. and Hristoski, I. S. *"Behavioral-based performability modeling and evaluation of e-commerce systems"*, Electronic Commerce Research and Applications, 13, 2014, pp. 320– 340.

[6] Hong, W. and Zhu, K. "*Migrating to internet-based e-commerce: Factors affecting ecommerce adoption and migration at the firm level*", Information & Management, 43, 2006, pp. 204–221.

[7] Lee, J. S. and Lin, K. S. "*A robust e-commerce service: Light-weight secure mail-order mechanism"*, Electronic Commerce Research and Applications, 11, 2012, pp. 388–396.

[8] Atif, Y. *"A distributed and interoperable object-oriented support for safe e-commerce transactions"*, Information and Software Technology, 46, pp. 2004, 149–164.

[9] Deng, L. and Poole, M. S. *"Aesthetic design of e-commerce web pages – Webpage Complexity, Order and preference"*, Electronic Commerce Research and Applications, 11, 2012, pp. 420–440.

[10] Rohini V, Ancy Merlyn D'Souza, Sachin Giriyappanavar, Sharun Mathew, "*Shopping Application For E-Commerce*", International Journal Of Advance Computer Technology | Volume 4, Number 3

[11] Burt, S. and Sparks, L. *"E-commerce and the retail process: a review"*, Journal of Retailing and Consumer Services, 10, 2003, pp. 275–286.

[12] Crespo, A. H. and Bosque, I. R. *"The influence of the commercial features of the Internet on the adoption of e-commerce by consumers"*, Electronic Commerce Research and Applications, 9, 2010, 562–575.

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1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Electronics & Tele-communication Engineering **Programme Code:** 1-1408968324			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Seminar & Project	ET416	119
2.	Project	ET425	
3.	Vocational Training	ET417	
4.	Mini Project (Hardware)	ET327	110

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Engineering Department

B.E. Project Record

A.Y.: 2019-2020

SVERI's College of Engineering, Pandharpur.

Department of Electronics & Telecommunication

Project List -BE (E&TC) A A.Y-2019-20

1	BE A 01	Lokhande Dhanshree	Smart Class Room using IOT	Mr. N S Admile
2		Tarange Reshma Sham		
3		Salunkhe Ashwini Kerappa		
4	BE A 02	Ghayal Manoj Baliram	To recognize the fruit status in refrigerator using deep Learning	Mr. Sandeep Bidwai
5		Shriram Amol Vitthal		
6		Taware Dadasaheb		
7		Katte Vijay Dhanappa		
8	BE A 03	Kalubarme Prashant D.	IOT Based Smart Farm Monitoring System	Dr. S R Patil
9		Misal Pandurang D.		
10		Navadkar Ganesh M.		
11	BE A 04	Devakar Arti Chandrakant	Happy Imotion Detection Using Image Processing and Deep Learning	Dr. M M Pawar
12		Ronge Swapnaja Yuvraj		
13		Tamboli Anisa Kadar		
14	BE A 05	Kaldhone Amruta Sanjay	Low cost Fingerprint Based Bank Locker Security System Using GSM	Ms. M. S. Biswas
15		Waghmode Yamini Vilas		
16		Jagtap Aniketa Ashok		
17	BE A 06	Yadav Chhaya Appa	Defect Identification and Maturity Detection of Fruits using Image Processing	Mr. J S Hallur
18		Asabe Vaishnavi Tanaji		
19		Yadav Kajal Anil		
20	BE A 07	Koli Vrushali Rajendra	Object Detection using Deep Learning	Dr. M. M. Pawar
21		Shinde Priyanka Subhash		
22		Jadhav Pranita Sunil		
23	BE A 08	Mujawar Simran	Direction 2x2 MIMO Microstrip Antenna design and Optimisation for LTE	Mr. Ashish Jadhav
24		Hake Prerana Prakash		
25		Kamble Snehal Baskar		
26	BE A 09	Satpute Annasaheb Sahebrao	Smart Security System for Jewellery shop using IOT	Mr. M. A. Deshmukh
27		More Sanket Hanumant		
28		Upase Sangmesh		
29		Gaikwad Vishal Ashok		
30	BE A 10	Moholkar Manasi Mahesh	Mutual Coupling Supression between two MIMO Microstrip Patch Antenna using Isolator	Mr. Ashish Jadhav
31		Waykule Pallavi		
32		Nagane Priyanka Vittal		
33		More Tanuja Ashok		
34	BE A 11	Deshmukh Ashwini Madhukar	Leaf App: Leaf classification using neural Networks	Ms. J S Shinde
35		Kharade Pragati Dinesh		
36		Vhanamane Sonali K		
37	BE A 12	Koli Sayali Shamrao	Low cost Fruit Grading and Sorting System	Dr. A. S. Vibhute
38		Mane Prachi Avadhut		
39		Chavan Sayali Dilip		
40	BE A 13	Maradkar Dnyaneshwari S	Automatic Potholes and Crack Detection using Image Processing and Alerting	Mr. M. A. Deshmukh
41		Patil Sayali S		
42		Sanjekar Pratiksha V		
43	BE A 14	Awad Asha Rajabhau	Video Stabilisation and Motion Detection using MatLab Video Processing	Mr. V. S. Bhong
44		Bagal Anuradha Haridas		
45		Rokade Soniya Sanjay		
46	BE A 15	Katkar Puja A.	Two stage convolutional neural network for noise	Mr. S A Inamdar
47		Kewate Snehal		
49	BE A 16	Bansode Usha Sunil	Pedestrian Detection by learning Deep featuers	Dr. M. M. Pawar
50		Dargude Pratiksha Nagnath		
51		Shingade Varsha Balvant		
52	BE A 17	Ghadage Pooja Anil	Health Care monitoring system using IOT	Dr. S R Patil
53		Baad Pooja Arjun		
54		Parbat Supriya Sayaji		
55	BE A 18	Wakade Prajakta Kashinath	Design and Implementation of Children Monitoring and Security System based on	Ms. S. S. Kadam
56		Yelmar Sucheta		
57		Pathak Prajakta P		
58	BE A 19	Danure Sidharam G.	MIMO IFA Antenna for Laptop Application at WLAN/5G C-Band	Mr. Ashish Jadhav
59		Bhuse Ajinkya Chandrakant		
60		Kambale Mahesh Bibhishan		
61	BE A 20	Kamble Reshma Hanumant	Air Pollution Monitoring System	Ms. J S Shinde
62		Dubal Samiksha Nanasaheb		
63		Patil Sonali Satish		

BE Project Coordinator

Dr. A.S.Vibhute
HOD E&TC Dept

SVERI's College of Engineering, Pandharpur.

Department of Electronics & Telecommunication

Project List -BE (E&TC) B A.Y-2019-20

Sr.No.	Project Group no.	Name of Student	Project Title	Guide Name
1	BE B 01	Katkar Anjali	Autonomous Robot for Delivering the Order in Restaurant by using Raspberry Pi	Mr. H. K. Bhaldar
2		More Kirti		
3		Yelasange Anjali		
4	BE B 02	Chavare Shubhangi S.	Garbage Collection and Monitoring System using RFID	Mr. Akshay A Jadhav
5		Koli jyoti Naganath		
6		Vakase Jyoti Dattatraya		
7	BE B 03	Samita Mykal	Pathology Lab Reporting Generating system using IOT	Dr. A. S. Vibhute
8		Potdar Gunjan		
9		Salge Varsha		
10	BE B 04	Baba Bhagyashri Shivshankar	Power Factor Improvement using Capacitor Filter	Mr. D. A. Kumbhar
11		Navalai Seema Laxman		
12		Patil Dhanshree		
13	BE B 05	Jagtap Janhavi	IOT Based Smart Helmet and Bike Analyzer	Mr. A M Kasture
14		Kamble Anandi		
15		Mahadik Kajal		
16	BE B 07	Sawant Mayuri	Fruit Plagrant using Image Processing	Mr. A. M. kasture
17		Ghadke Pooja Ganpati		
18		Survase Tejaswini Vishnu		
19	BE B 08	Kakade Pooja	Design and development of Prototype lamp lightning with Road Side Vertical Axis Wind Energy Harvester	Ms. N S Patil
20		Patil Sangita		
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27		Bangi Alfiya		
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30		Patil Nishigandha		
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32		Asbe Pratima		
33		Navgire Pragati		
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55		Gaondavale Sanjay		
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"Implement Bridge Strength Monitoring and Accident Prevention System"

has been submitted by

Project Group No.:- B-14

1) Sonar Abhishek Rajkumar
2) Sayyad Tanjim Mahammad
3) Ranaware Rohit Suhas

For partial fulfillment of Bachelor Degree in Electronics and Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. H. K. Bhaldar)
Project Guide

(Dr. A. S. Vibhute)
Head, E&TC Engg. Dept.

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Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the dissertation entitled

"IOT based Real Time Traffic Light Control to Reduce Vehicles CO2 Emission"

has been submitted by

Project Group No.:- B-15

1) Dhotre Rohini Shahaji
2) Arekar Uma Tukaram
3) Swami Charushila Chidanand

For partial fulfillment of Bachelor Degree in Electronics and Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. L. A. Palange)
Project Guide

(Dr. A. S. Vibhute)
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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the dissertation entitled

"Solenoid Valve Control using GSM Technology"

has been submitted by

Project Group No.:- B-16

1) Vyavahare Sachin Dattatray
2) Molak Omkar Anil
3) Patil Mukul Madhusudan

For partial fulfillment of Bachelor Degree in Electronics and Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. M. S. Mathpati)
Project Guide

(Dr. A. S. Vibhute)
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CERTIFICATE

This is to certify that the dissertation entitled

"Smart Framework for Environmental Pollution Monitoring and Controlling using IOT"

has been submitted by

Project Group No.:- B-17

1) Khilari Nilambika Rudrappa
2) Jadhav Mayuri Tippanna
3) Bagal Mohini Tanaji

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CERTIFICATE

This is to certify that the dissertation entitled

"IOT Based Smart Energy Meter and Billing System"

has been submitted by

Project Group No.:- B-18

1) Patil Punam Laxman
2) Gore Janabai Balasaheb
3) Karande Jayashri Dattatraya

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CERTIFICATE

This is to certify that the dissertation entitled

"Banana Tree Disease Detection using Image Processing"

has been submitted by

Project Group No.:- B-19

1) Devkate Pooja Sham
2) Hindule Madhavi Shashikant
3) Shahane Manasi Mahesh

For partial fulfillment of Bachelor Degree in Electronics and Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

This is to certify that the dissertation entitled

"Design and Development of 3-Phase Motor Control Drive as per Line Voltage Variations"

has been submitted by

Project Group No.:- B-20

1) Mane Harshdip Shailesh
2) Gondawale Sanjay Rajaram
3) Gurav Umesh Bateshwar

For partial fulfillment of Bachelor Degree in Electronics and Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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Electronics & Tele-communication Engineering Department

T.E. Mini-Project Record

A.Y.: 2019-2020

TE A Div Project Groups A. Y. 2019-20
Status of TE ENTC Project Sem-I& II

Sr.No.	Project Group no.	Name of Student	Roll No.	Area of Interest	Name of Guide	Title of Project as HMP	
1	TE A 01	Namdas Dipika Dnyaneshwar	20	IoT	Dr. A.S. Vibhute	IOT Based Smart Irrigation System using Aurdino	
2		Patil Ashvini Maruti	22				
3		Duchal Snehal Balasaheb	3				
4		Mendhegiri Shweta Shantinath	13				
5	TE A 02	Amit Danure	38	IoT, Embedded System	Ms. V. A. Patil	Automatic Speed Control & Accident Avoidance Vehicle using Multisensors	
6		Santosh Ubale	59				
7		Imran Shaikh	57				
8	TE A 03	Pathan Sameer K.	52	Embedded , Image, A. I.	Mr. H. K. Bhaldar	Cell Phone Operated Robotic Vehicle	
9		Bachute Bhushan S	36				
10	TE A 04	Walekar Smita Mahadev	33	Sensor based Agricultural Automation	Mr. S. A. Inamdar	IoT Based Irrigation System using Sensors	
11		Wagaj Sonali Shivaji	31				
12		Wagaj Pratiksha Hanumant	30				
13	TE A 07	Mulani Salman Shahajahan	49	IoT and Robotics	Mr. A. M. Kasture	Smart Dust Bin (23-01-20)	
14		Kulkarni Prathmesh Prakash	46				
15		Sarwadkar Manjunath Sidram	56				
16	TE A 08	Dhamane Aishwarya Sanjay	14	Image Processing	Mrs. J. S. Shinde	Fruit-Detection using IPM	
17		Mahajan Ishita Pradip	12				
18		Harane Sanjivani Raju	6				
19	TE A 09	chavare Bhushan Mahavir	37	Robotics	Mr. A. M. Kasture	Smart Waste Management System (23-01-20)	
20		Koli Sudarshan Somaraya	45				
21		Pachave Nitin Subhash	51				
22	TE A 10	Nikte Geeta Prashant	21	Medical Electronics	Dr.M.M.Pawar	Password Based Door Lock System	
23		Nagane Prajakta Dayanand	65				
24		Shembade Janhavi Dilip	27				
25		Phulare Nikita Sham	24				
26	TE A 11	Guruji Gaurav Dattatraya	41	Antenna Design	Mr. Ashish A. Jadhav	MIMO- Antenna Design	
27		Darshanale Swapnil Prakash	39				
28		Hodade Rushikesh Somnath	42				
29	TE A 12	Chavan Rutuja Shivaji	2	Robotics	Mr. H. K. Bhaldar	Design & Development of Robotic Arm for Multipurpose Applications	
30		More Komal Nanasaheb	17				
31		Repal Shraddha Anil	26				
32	TE A 13	Aldar Sushant Tanaji	35		Ms. N. P. Kulkarni	Flood Detection using IoT	
33		Patil Vishal Vijaykumar	53				
34		More Rushikesh Machindra	47				
35	TE A 14	Salunkhe Omkar Arun	55		Ms. S. S. Kadam	Sun Tracking Solar Panel using Microcontroller	
36		Pawar Sanjay Shankar	54				
37		Chakote Digvijay Girish	60				
38		More Vikram Aankush	48				
39	TE A 15	Vhargar Monali Vilas	29	Medical Electronics	Mr. S. S. Kadam	Automatic Room Lightning using Microcontroller	
40		Mule Saujanya Subhash	18				
41		Kale Abhilasha Avinash	7				
42	TE A 16	Yalmar Akash Bhimrao	61		Ms. P. B. Kashid	Google Assistant Controlled Home Automation	
43		Thorat Ashutosh Ramesh	66				
44	TE A 17	Hegade Nikita Maruti	62	Embedded Systems	Mr. A. D. Mali	Aurdino based smart Integration System	
45		Lokhande Mayuri Sanjay	63				
46	TE A 18	Ghuge Ashwini Dattatrya	4	Bio- Medical Electronics	Mr. M. S. Mathpati	Coridoor Light Controller using Microcontroller	
47		Gunjal Surekha Vilas	5				
48		Khandekar Nisha Soudagar	9				
49	TE A 19	Avadhut Renuka Audumbar	1	IoT, Embedded System & Robotics	Mr. Akshay A. Jadhav	Design of Magnetic Laviation using Microcontroller	
50		Rajmane Manali Sunil	25				
51		Shirame Amruta Dhanaji	28				
52	TE A 20	Kale Komal Kiran	8	IoT ,Power Electronics & Robotics	Mr.D.P. Narsale	Agriculture Soil-monitoring using IoT	
53		Mirgane Shraddha Bharat	16				
54		Ware Saroja Shyamrao	34				
55	TE A 21	Kadam Omkar Sunil	44	IoT ,Power Electronics & Robotics	Mr. M. A. Deshmukh	Home Automation using IoT	
56		Dandawate Upendra N.	40				
	Total:-19	Total Students:-56					

TE Project Coordinator

HOD

TE B Div Project Groups A. Y. 2019-20
Status of TE ENTC Project Sem-1 & II

Sr.No.	Project Group no.	Name of Student	Roll No.	Area of Interest	Guide Name	Title of Project as HMP	
1	TEB 01	More Vaishnavi Jaysing	25	IoT & Image Processing	Dr. A. S. Vibhute	RBC-To-WBC Blood-Count	
2		Devkate Gayatri Chichalappa	6				
3		Bhaganagare Aishwarya Rajesh	3				
4		Nirmale Rutuja Narayan	26				
5	TEB 02	Maske Akshay Rajendra	47	Embedded Systems	Ms. L. A. Palange	Bipolar LED Driver Circuit using Microcontroller	
6		katkamwar shrinivas D	46				
7		suryawanshi chandrashikhar	53				
8	TEB 03	Shinde Jyoti Sanjay	33	DSP based system	Prof.M.S.Mathpati	Arduino based Home Automation using Node MCU	
9		Korape Vaishnavi Sanjay	18				
10		Shelake Puja Ramchandra	32				
11	TEB 04	Kumbhar Seema Ramdas	19	Embedded Systems	Mr.D.P. Narsale	Human speed detection using microcontroller	
12		Dhekale Pratiksha Rajaram	28				
13		Randive Ashwini Brambdev	30				
14		Ghdage Shivani Ganesh	58				
15	TEB 05	Godase Shruti Nagesh	12	Embedded Systems	Mr.D.P. Narsale	LPG Gas Leakage Monitoring & Detection using Microcontroller	
16		Dudhal Rutuja Suresh	8				
17		Jagtap Suranjali Bandu	15				
18	TEB 06	Mane Priyanka Satish	20	Embedded Systems	Mr. Akshay A. Jadhav	IoT Based Home Security System using Rasbery-Pi	
19		Thengal Pallavi Vishwas	36				
20		Patil Ashwini Bhausaheb	27				
21	TEB 07	Jadhav Vrushali Arun	14	Embedded Systems	Mr. D. A. Kumbhar	Unit Remote Control Home Automation	
22		Molak Komal Tanaji	22				
23		Ghongade Prajakta Dilip	11				
24	TEB 08	Shaikh Saniya Abdulla	31	IoT & Embedded Systems	Mr. J. S. Hallur	Vehical-parking system using microcontroller.	
25		Wadtile Vaishnavi Janardan	39				
26		Indi Shivganga Subhash	13				
27	TEB 09	Ghodake Shubham Tukaram	44		Mrs. J. S. Shinde	Fruit-Detection using m.	
28		Vhasale Sagar Appaso	55				
29	TEB 10	Shaikh Shoyeb Ayub	52	Embedded Systems	Ms. G. G. Unahale	Human speed detection using microcontroller	
30		Pathan Jameer Salim	50				
31		JADHAV MAHESH SHIVAJI	45				
32	TEB 11	More Suhashini Balaji	24	Embedded Systems & VLSI	Mr. N. S. Admile	Sun Tracking Solar Panel using Microcontroller	
33		Deokar Namrata Dattatray	7				
34		Bagal Madhuri Navnath	1				
35	TEB 12	Manepatil Aarti Shahaji	21	Embedded Systems	Mr. S. P. Swami	Crying Baby detector using Arduino	
36		Khandare Darshana Rajesh	60				
37		Walugade Pratiksha Ankush	40				
38	TEB 13	Pujari Sapna Siddharam	29	Embedded & VLSI Systems	Ms. L. A. Palange	Automatic Light Controller using Microcontroller	
39		Vanave Suchitra Bibhishan	37				
40		Vidhate Dnyaneshwari Gorakh	38				
41	TEB 14	Yadav Prajakta Dharmaraj	41	Embedded & VLSI Systems	Ms. N. P. Kulkarni	Smart Blind Stick using Ultrasonic Sensor & Microcontroller	
42		Gawali Renuka Sahadev	10				
43		More Mayuri Arvind	23				
44	TEB 15	Tapise Puja Digambar	35	Embedded Systems	Mr. J. S. Hallur	Power Factor Improvement using Microcontroller	
45		Bennesur Laxmi Iranna	2				
46		Jamagi Yogini Siddhapa	16				
47	TEB 16	Mukare Vaibhav S.	49	DSP based system	Mr. N. S. Admile	Talking Engergy Meter based on Microcontroller	
48		Salunkhe Tushar T.	51				
49		Pandhare Nitin Vasudeo	57				
50	TEB 17	Gaikwad Amruta Balasaheb	9	Antenna Design	Mr. Ashish A. Jadhav	Light & Fan Control using Microcontroller	
51		Bharama swati Shivalingappa	4				
52		Bhosale Utkarsha Bharat	5				
53	TEB 18	Deshmukh Abhishek Vilas	42		Mr. A. A. Kadam	IOT-based Home automation	
55		Parakhe Vallabh Sanjay	62				
	Total:-18	Total Students:-54					

TE Project Coordinator

HOD

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*
"IOT based smart Integration system using Aurdino"
has been submitted by

Mini hardware Project Group No.:- A01

1) Namdas Dipika Dnyaneswar
2) Patil Ashwini Maruti
3) Shenal balasaheb Duchal
4) Mendhegiri shweta shantinath

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Dr.A.S.Vibhute)
Project Guide

(Dr. A.S.Vibhute)
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B. Ronge

(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Automatic Speed Control and Accident Avoidance vehicle using Multisensors"

has been submitted by

Mini hardware Project Group No.:- A02

1) Amit Danure
2) Santosh Ubale
3) Imran Shaikh

For partial fulfillment of ***Mini Hardware Project in TE PART-II*** *Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Ms.V.A.Patil)
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Cell phone operated Robotic Vehicle"

has been submitted by

Mini hardware Project Group No.:- A03

1) Pathan Sameer K.
2) Bachute Bhushan S.

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Mr.H.K.Bhaldar)
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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"IOT based irrigation system using Sensors"

has been submitted by

Mini hardware Project Group No.:- A04

1) Walekar smita Mahadev
2) Waghaj Sonali Shivaji
3) Waghaj pratiksha Hanumanth

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Smart dust Bin"

has been submitted by

Mini hardware Project Group No.:- A07

1) Mulani Salman
2) Kulkarni Prathmesh
3) Sarwadkar Manjunath Sidram

*For partial fulfillment of **Mini Hardware Project in TE PART-II** Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Mr.A.M.Kasture)
Project Guide

(Dr. A.S.Vibhute)
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(Dr. B. P. Ronge)
Principal

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Fruit Detection Software"

has been submitted by

Mini hardware Project Group No.:- A08

1) Mhamane Aishwarya Sanjay
2) Mahajan Ishita Pradip
3) Harane Sanjivani Raju

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Mrs.J.S.Shinde)
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(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Smart Waste management system"

has been submitted by

Mini hardware Project Group No.:- A09

1) Chavan Bhushan Mahavir
2) Koli Sudarshan Somaraya
3) Pachave Nitin

For partial fulfillment of ***Mini Hardware Project in TE PART-II*** *Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Mr.A.M.Kasture)
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Passward based door locked system"

has been submitted by

Mini hardware Project Group No.:- A10

1) Nikate Geeta Prashant
2) Nagane Prajkata
3) Shebade Janhavi
4) Phulare Nikita

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Dr.M.M.Pawar)
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(Dr. B. P. Ronge)
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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"MIMO Antenna Design"

has been submitted by

Mini hardware Project Group No.:- A11

1) Guruji Gurav
2) Darshale Swapnali
3) Hodade Rushikesh

*For partial fulfillment of **Mini Hardware Project in TE PART-II** Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Mr.A.A.Jadhav)
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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Design And Development of Robotics Arm for Multipurpose Applications"

has been submitted by

Mini hardware Project Group No.:- A12

1) Chavan Rutuja
2) More Komal
3) Shradhha Repal

*For partial fulfillment of **Mini Hardware Project in TE PART-II** Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Mr.H.K.Bhaldar)
Project Guide

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(Dr. B. P. Ronge)
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*
"Flood Detection using IOT"
has been submitted by

Mini hardware Project Group No.:- A13

1) Sushant Aldar
2) Patil Vishal Vijaykumar
3) More Rushikesh

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Ms.N.P.Kulkarni)
Project Guide

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(Dr. B. P. Ronge)
Principal

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Sun tracking Solar Panel using Microcontroller"

has been submitted by

Mini hardware Project Group No.:- A14

1) Salunkhe Omkar
2) Pawar Sanjay
3) Chakote Digvijay
4) More Vikram

*For partial fulfillment of **Mini Hardware Project in TE PART-II** Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Ms.S.S.Kadam)
Project Guide

(Dr. A.S.Vibhute)
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(Dr. B. P. Ronge)
Principal

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*
"Automatic Room Lightning using Microcontroller"
has been submitted by

Mini hardware Project Group No.:- A15

1) Vhargar Monali
2) Mule Saujanya
3) Kale Abhilasha

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Ms.S.S.kadam)
Project Guide

(Dr. A.S.Vibhute)
Head, E&TC. Engg. Dept.

(Dr. B. P. Ronge)
Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*
"Google Assistant controlled Home Automation"
has been submitted by

Mini hardware Project Group No.:- A16

1) Yalmar Akash
2) Thorat Ashutosh Ramesh

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Ms.P.B.Kashid)
Project Guide

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(Dr. B. P. Ronge)
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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Aurdino based smart Integration system"

has been submitted by

Mini hardware Project Group No.:- A17

1) Hegade Nikita
2) Lokhande Mayuri

For partial fulfillment of ***Mini Hardware Project in TE PART-II*** *Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

(Mr.A.D.Mali)
Project Guide

(Dr. A.S.Vibhute)
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(Dr. B. P. Ronge)
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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*
"Coridoor Light Controller using Microcontroller"
has been submitted by

Mini hardware Project Group No.:- A18

1) Ghuge Ashwini
2) Gunjan Surekha
3) Khandekar Nisha

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Mr.M.S.Mathapati)
Project Guide

(Dr. A.S.Vibhute)
Head, E&TC. Engg. Dept.

B-Ronge
(Dr. B. P. Ronge)
Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Design of Magnetic laviation using Microcontroller"

has been submitted by

Mini hardware Project Group No.:- A19

1) Avadhut Renuka
2) Rajmane Manali
3) Shirame Amruta

For partial fulfillment of ***Mini Hardware Project in TE PART-II***

Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Agricultural soil monitoring using IOT"

has been submitted by

Mini hardware Project Group No.:- A20

1 Kale Komal

2 Mirgane Shradhha

3 Ware saroja

For partial fulfillment of ***Mini Hardware Project in TE PART-II***

Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Home automation using IOT"

has been submitted by

Mini hardware Project Group No.:- A21

1) Kadam Omkar
2) Dandawate Upendra

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*
"RBC TO WBC Blood count on Image Processing."
has been submitted by

Mini Hardware Project Group No.:- B-01

1) More Vaishnavi Jaysing
2) Devkate gayatri Chichalappa
3) Bhaganagare Aishwarya Rajesh
4) Nirmale Rutuja Narayan

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. Dr.A S Vibute)
Project Guide

(Dr.A S Vibhute)
Head, E&TC. Engg. Dept.

B-Ronge
(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*
"Bipolar LED Driver Circuit using Microcontroller."
has been submitted by

Mini Hardware Project Group No.:- B-02

1) Maske Akshay Rajendra
2) Katkamwar Shrinivas D
3) Suryawanshi Chandrashekhar

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*
"Arduino based Home Automation using Node MCU."
has been submitted by

Mini Hardware Project Group No.:- B-03

1) Shinde Jyoti Sanjay
2) Korape Vaishnavi Sanjay
3) Shelke Puja Ramachandra

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Human Speed Detection using microcontroller."

has been submitted by

Mini Hardware Project Group No.:- B-04

1. Kumbhar Seema Ramdas
2. Dhekale Pratiksha Rajaram
3. Randive Ashwini Brahmdev
4. Ghadage Shivani Ganesh

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"LPG gas leakage Monitoring & Detection using microcontroller."

has been submitted by

Mini Hardware Project Group No.:- B-05

1. Godse Shruti Nagesh
2. Dudhal Rutuja Suresh
3. Jagtap Suranjali Bandu

For partial fulfillment of ***Mini Hardware Project in TE PART-II*** *Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*
"IOT Based Home security system using Rasbery-Pi."
has been submitted by

Mini Hardware Project Group No.:- B-06

1. Mane Priyanka Satish
2. Thengal pallavi Vishwas
3. Patil AShwini Bhausaheb

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

17/5/2019

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Unit Remote control Home Automation ."

has been submitted by

Mini Hardware Project Group No.:- B-07

1. Jadhav Vrushali Arun
2. Molak Komal Tanaji
3. Ghonagade Prajakta Dilip

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Vehical parking System using microcontroller ."

has been submitted by

Mini Hardware Project Group No.:- B-08

1. Shaikh Saniya Abdulla
2. Wadtile Vaishnavi Janaradan
3. Indi Shivganaga Subhash

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Fruit Detection System using IoT."

has been submitted by

Mini Hardware Project Group No.:- B-09

1. Ghodake Shubham Tukaram
2. Vhasale Sagar Appaso

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Human Speed Detection Using Microcontroller ."

has been submitted by

Mini Hardware Project Group No.:- B-10

1. Shaikh Shoib Ayub
2. Pathan Jameer Salim

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(Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Sun Tracking Solar panel using Microcontroller ."

has been submitted by

Mini Hardware Project Group No.:- B-11

1. More Suhashini Balaji
2. Deokar Namrata Dattatray
3. Bagal Madhuri Navnath

For partial fulfillment of ***Mini Hardware Project in TE PART-II***

Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Crying Baby Detector using Arduino ."

has been submitted by

Mini Hardware Project Group No.:- B-12

1. Manepatil Arati Shahaji
2. Khandare darshana Rajesh
3. Walugude Pratiksha Ankush

*For partial fulfillment of **Mini Hardware Project in TE PART-II** Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

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(Dr. B. P. Ronge)
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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*
"Automatic Light controller using Microcontroller ."
has been submitted by

Mini Hardware Project Group No.:- B-13

1. Pujari sapna Siddharam
2. Vanve Suchita Bibhisham
3. Vidhate Dnyaneshwari Gorakh

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Smart Blind Stick using Ultrasonic Sensor & Microcontroller."

has been submitted by

Mini Hardware Project Group No.:- B-14

1. Yadav Prajakata Dharmaraj
2. Gawali Renuka Sahadev
3. More Mayuri Arvind

*For partial fulfillment of **Mini Hardware Project in TE PART-II** Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.*

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CERTIFICATE

*This is to certify that the **Mini Hardware Project** entitled*

"Power Factor Improvement using Microcontroller."

has been submitted by

Mini Hardware Project Group No.:- B-15

1. Tapise Puja Digambar
2. Bannesur Laxmi Iranna
3. Jamagi Yogini Siddhappa

*For partial fulfillment of **Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. J S Hallur)
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*
"Talking Energy Meter based on Microcontroller."
has been submitted by

Mini Hardware Project Group No.:- B-16

1. Mukare Vaibhav S
2. Salunkhe Tushar T
3. Pandhare Nitin Vasudeo

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. N S Admile)
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*
"Light & Fan Control Using Microcontroller."
has been submitted by

Mini Hardware Project Group No.:- B-17

1. Gaikwad Amruta Balasaheb
2. Bharama Swati Shivlingappa
3. Bhosale Utkarsha Bharat

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. A A Jadhav)
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CERTIFICATE

This is to certify that the ***Mini Hardware Project*** *entitled*

"Light & Fan Control Using Microcontroller."

has been submitted by

Mini Hardware Project Group No.:- B-18

1. Deshmukh Abhishek Vilas
2. Parakhe Vallabh Sanjay

For partial fulfillment of ***Mini Hardware Project in TE PART-II***
Electronics & Telecommunication Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Civil Engineering Programme Code: 1-1408968331			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Building Construction and Drawing	CV213	69
2.	Engineering Geology	CV215	
3.	Water Supply Engineering	CV221	
4.	Environmental Engineering-I	CV313	72
5.	Water resources Engineering-II	CV314	
6.	Environmental Engineering-II	CV323	
7.	Mini Project in SM-III/GE-II/EE-II/EMII using Application Software	CV328	
8.	Assessment of field training report	CV329	
9.	Project Work	CV417	76
10.	Assessment of Report on Field Training-II	CV418	
11.	Project Work	CV426	

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College of Engineering, Pandharpur

Civil Engineering Department

Project

Class: BE (Civil)

A.Y.: 2019-2020

SHRI VITHAL EDUCATION & RESEARCH INSTITUBE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Project work-I, Assessment of report on field training-II, Project work-II

BE Project Groups

Class: BE **Academic Year 2019-20**

Sr. No.	Group No.	NAME OF STUDENT	Project Title	NAME OF GUIDE
1	BE-1	/DESHMUKH SNEHA SHIVAJIRAO	Strainthning of black cotton soil using different additive.	PROF. P. D. TARALGATTI
2		/KATE PRANITA ANAND		
3		/PAWAR MRUNAL MADHUKAR		
4		/POLAS POOJA PRUSHOTTAM		
5		/MASAL AISHWARYA NILKANTH		
6		/SHINDE PRIYADARSHANI RAVINDRA		
7	BE-2	/BHISE KIRAN KISAN	Simulation and analysis of dispersion of brine water from a desalination plant	PROF. Y. B. PATEL
8		/DAHIHANDE JYOTI GAURISHANKAR		
9		/DESHMUKH SUSHAMA MAHADEV		
10		/SARTAPE PRANALI RAJENDRA		
11		/PUJARI PRIYANKA TUKARAM		
12	BE-3	/JAGTAP PRAGATI MITHU	Experimental Investigation on concrete by using Zama Bricks as a partial replacement of course aggregate in concrete	PROF. S. P. PATIL
13		/KAMBLE ASHWINI ARVIND		
14		/KUMBHAR ANJALI GANPAT		
15		/PAWALE SHRADDHA RAJENDRA		
16		/SARVAGOD PRACHI JITENDRA		
17		/SHIKHARE SADHANA NAGNATH		
18	BE-4	/BHOSALE KAJAL BHARAT	Design of flexible pavement by using west plastics, flag and rap.	PROF. C. R. LIMKAR
19		/PAREKAR MRUNALI BIRUDEV		
20		/RONGE POOJA BABRUVAHAN		
21		/WAGHMODE PRAJAKTA SOPAN		
22		/ZENDE PRIYA BRAMHADEO		
23	BE-5	/CHIKMANE ANKITA ANIL	The Strength analysis of bubbled beams	PROF. S. A. GOSAVI
24		/PATIL RUTUJA NAGESH		
25		/DHUMAL HARSHADA PANDURANG		
26		/TEKE MADHURI KISHOR		
27	BE-6	BHARTI SHRINIVAS VISHNU	Design and analysis of continues reinforced concrete pavement using RAP.	PROF. R. S. SATHE
28		GORE SUDHIR PARMESHWAR		
29		GURAV SANKET SHRIRANG		
30		SAWANT GAURAV VITTHAL		
31		SAWANT SHAILESH SHASHIKANT		
32	BE-7	KADAM SHUBHAM SUNIL	Ultrasonic pulse velocity performance analysis for various loading condition.	PROF A. B. KOKARE
33		BABAR GANESH SHANKAR		
34		KALE VAIBHAV VASANT		
35	BE-8	MULANI MOIN LATIF	Houses on Floating Bottles	PROF. S.R. PATHAN
36		WAGHAMODE ANANDA BALASAHEB		
37		GADASE AKASH SURESHRAO		
38	BE-9	GAIKWAD PRASHANT MANIK	Effect of Geometric Irregularities on RCC multi-storey framed structures.	PROF. M.S. SURVASE
39		MULE AVINASH SITARAM		
40		NARSALE SUHAS JAYHIND		
41		SHINDE GANESH MADAN		
42		SHAIKH SHOAIB SALIM		
43	BE-10	GORE KRISHNA DEVIDAS	Characterization of Quality control of concrete	PROF. S.P. PATIL
44		JADHAV VAIBHAV DEVIDAS		
45		MALI PRATHAMESH KRISHANA		
46		PAWAR SAURABH BABAN		
47		PUJARI HANAMANT SHRISHAIL		
48		SOUDAGAR PRASAD SHIVAJI		

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

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Sr. No.	Group No.	NAME OF STUDENT	Project Title	NAME OF GUIDE
49	BE-11	GAIKWAD KAPIL VIJAY	Design and analysis of continues reinforced concrete pavement using RAP.	PROF. S. D. JAGDALE
50		LONDHE AVINASH RAJENDRA		
51		GAIKWAD PAWAN A		
52		PAWAR SWAPNIL JIBENDRA		
53		SHINDE SUSHANT RAMASH		
54	BE-12	MANE SHITAL	An experimental Study on Black Cotton Soil Treated with GGBS and Renolith	PROF. M.G. DESHMUKH
55		/DONGARE SHUBHANGI KANHOBARAO		
56		/THORAT AISHWARAYA ANAND		
57		/VIBHUTE JYOTI ASHOK		
58	BE-13	SARVADE AKASH PANDURANG	waste water treatment using moringa seed powder	Dr. V.S. KSHIRSAGAR
59		PUJARI PRAKASH RAJKUMAR		
60		GADADE ABASAHEB DADASO		
61		GODASE SANDIP SUKHADEO		
62	BE-14	GUNDRE RAMDAS SANJIV	Numerical study on strenghtning of composit bridges.	Prof. P. B. Bhaganagare
63		KULKARNI SHUBHAM RAJENDRA		
64		PATIL PRASAD MANIKRAO		
65		Kadam Sagar		
66		Kapil Jagtap		
67		Bandgar Shubham		
68	BE-15	GADAVE AJINKYA	Application of Remote Sensing and Geographical Information System for Environmental Management	Dr. R.S. PAWAR
69		MANE AMIT		
70		KIRAN SANGLE		
71		SANKET UBALE		
72		MAHESH MUTYAL		
73	BE-16	GAWADE AJAY SANTOSH	Design of public transit system for cities in India.	PROF. C.R. LIMKAR
74		HONMANE SAGAR SIDDHESHWAR		
75		KADAM VIRAJ MARUTI		
76		KANGUDE YOGESH BALKRISHNA		
77		ATKALE AKASH SHASHIKANT		

(S.A. GOSAVI)
Project Co-ordinator

(Dr. P.M. Pawar)
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CERTIFICATE

This is to certify that the dissertation entitled

"Strengthening of Black Cotton Soil using different additives"

has been submitted by

Project Group No.:- 01

1) /Deshmukh Sneha S
2) /Kate Pranita A
3) /Pawar Mrunal M
4) /Polas Pooja P
5) /Masal Aishwarya N
6) /Shinde Priyadarshani R

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

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(Prof. Dr. P M Pawar)
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CERTIFICATE

This is to certify that the dissertation entitled

"Simulation and analysis of dispersion of brine water from a desalination plant"

has been submitted by

Project Group No.:- 2

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2) /DAHIHANDE JYOTI G
3) /DESHMUKH SUSHAMA M
4) /SARTAPE PRANALI R
5) /PUJARI PRIYANKA T

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(Prof. Y B Patel)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

This is to certify that the dissertation entitled

"Experimental Investigation on concrete by using Zama Bricks as a partial replacement of course aggregate in concrete"

has been submitted by

Project Group No.:- 03

1) /JAGTAP PRAGATI M
2) /KAMBLE ASHWINI A
3) /KUMBHAR ANJALI G
4) /PAWALE SHRADDHA R
5) /SARVAGOD PRACHI J
6) /SHIKHARE SADHANA N

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

Patil

(Prof. /S P Patil)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

B-Ronge

(Prof. Dr. B. P. Ronge)
Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

CERTIFICATE

This is to certify that the dissertation entitled

"Design of flexible pavement by using waste plastics, fly-ash and RAP"

has been submitted by

Project Group No.:- 04

1) /Bhosale Kajal B
2) /Parekar Mrunali B
3) /Ronge Pooja B
4) /Waghmare Prajakta S
5) /Zende Priya B

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. C R Limkar)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"The Strength analysis of bubbled beams"

has been submitted by

Project Group No.:- 05

1) /CHIKMANE ANKITA A
2) /PATIL RUTUJA N
3) /DHUMAL HARSHADA P
4) /TEKE MADHURI K

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. S A Gosavi)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Design and analysis of continues reinforced concrete pavement using RAP"

has been submitted by

Project Group No.:- 06

1) BHARTI SHRINIVAS V
2) GORE SUDHIR P
3) GURAV SANKET S
4) SAWANT GAURAV V
5) SAWANT SHAILESH S

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. R S Sathe)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Ultrasonic pulse velocity performance analysis for various loading condition"

has been submitted by

Project Group No.:- 07

1) KADAM SHUBHAM S
2) BABAR GANESH S
3) KALE VAIBHAV V

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. A B Kokare)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Houses on Floating Bottles"

has been submitted by

Project Group No.:- 08

1) MULANI MOIN LATIF
2) WAGHAMODE ANANDA B
3) GADASE AKASH S

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. S R Pathan)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Effect of Geometric Irregularities on RCC multi-storey framed structures"

has been submitted by

Project Group No.:- 09

1) GAIKWAD PRASHANT M
2) MULE AVINASH S
3) NARSALE SUHAS J
4) SHINDE GANESH M
5) SHAIKH SHOAIB S

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. M S Survase)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
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CERTIFICATE

This is to certify that the dissertation entitled

"Characterization of Quality control of concrete"

has been submitted by

Project Group No.:- 10

1) GORE KRISHNA D
2) GORE KRISHNA D
3) MALI PRATHAMESH K
4) PAWAR SAURABH B
5) PUJARI HANAMANT S
6) SOUDAGAR PRASAD S

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

Patil

(Prof. / S P Patil)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

B Ronge

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Design and analysis of continues reinforced concrete pavement using RAP"

has been submitted by

Project Group No.:- 11

1) GAIKWAD KAPIL V
2) LONDHE AVINASH R
3) GAIKWAD PAWAN A
4) PAWAR SWAPNIL J
5) SHINDE SUSHANT R

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. S D Jagdale)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"An experimental Study on Black Cotton Soil Treated with GGBS and Renolith"

has been submitted by

Project Group No.:- 12

1) MANE SHITAL
2) /DONGARE SHUBHANGI K
3) /THORAT AISHWARAYA A
4) /VIBHUTE JYOTI A

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. M G Deshmukh)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled
"waste water treatment using moringa seed powder"
has been submitted by

Project Group No.:- 13

1) SARVADE AKASH P
2) PUJARI PRAKASH R
3) GADADE ABASAHEB D
4) GODASE SANDIP S

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. Dr. V S Kshirsagar)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Numerical study on strengthening of composite bridges"

has been submitted by

Project Group No.:- 14

1) GUNDRE RAMDAS S
2) KULKARNI SHUBHAM R
3) PATIL PRASAD M
4) KADAM SAGAR
5) JAGTAP KAPIL
6) BANDGAR SHUBHAM

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. P B Bhaganagare)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Application of Remote Sensing and Geographical Information System for Environmental Management"

has been submitted by

Project Group No.:- 15

1) GADAVE AJINKYA
2) MANE AMIT
3) KIRAN SANGLE
4) SANKET UBALE
5) MAHESH MUTYAL

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. Dr. R S Pawar)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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CERTIFICATE

This is to certify that the dissertation entitled

"Use of waste polystyrene as a partial replacement for fine aggregate in concrete"

has been submitted by

Project Group No.:- 16

1) Gawade Ajay S
2) Honmane Sagar S
3) Kadam Viraj M
4) Kangude Yogesh B
5) Atkale Akash S

For partial fulfillment of Bachelor Degree in Civil Engineering as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020.

(Prof. C R Limkar)
Project Guide

(Prof. Dr. P M Pawar)
Head, Civil Engg.

(Prof. Dr. B. P. Ronge)
Principal

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College of Engineering, Pandharpur

Civil Engineering Department

Mini Projects

Class: TE (Civil)

A.Y.: 2019-2020

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P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: 7755990201 Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in Website.: www.sveri.ac.in
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NAAC Accreditated Institute, NBA Accredited All UG Programmes.
ISO 9001:2008 Certified Institute.

Department of Civil Engineering

Date: 06/01/2020

Notice

As per Punyashlok Ahilyadevi Holkar Solapur University's curriculum of TY (Civil), a Mini Project task is assigned to all the TY (Civil) students. In the view of this engg surveys are to be conducted on 09th & 10th Jan 2020. The details of the tasks are as follow:

Sr. No.	Name of Village	Title of Mini Project	Groups of the students	Name of Guides and Coordinator
1	Gopalpur	Survey for Design of Sewerage system for Gopalpur Village	Roll No. T1- Roll No. T12	Prof. Taralgatti P D, Prof. Londhe S N Prof. Bhaganagare P B
2	Gopalpur	Survey for Design of Water supply system for Gopalpur Village	Roll No. T13- Roll No. T25	Prof. Kokare A B, Prof. Sathe R S, Prof. Patil S S
3	Anawali	Survey for Design of Sewerage system for Anawali Village	Roll No. T26- Roll No. T40	Prof. Surwase S S, Prof. Pawar R S Prof. Pathan S R
4	Anawali	Survey for Design of Water supply system for Anawali Village	Roll No. T41- Roll No. T56	Prof. Limkar C R, Prof. Deshmukh M G, Prof. Basavraj M
5	Anawali	Survey for Watershed Management of Anawali Village	Roll No. T57- Roll No. T72	Prof. Jagdale S D, Prof. Pawar H R, Prof. Patel Y B

All the concerned students and faculty members are hereby informed to take the note of the same and act accordingly.

Prof. S A Gosavi
Project Coordinator

Dr. P M Pawar
HOD

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COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

List of Students for Mini Project

Class- TE(Civil) Academic Year: 2019-20

Sr. No.	Group No.	NAME OF STUDENT	Project Title	Name of Guides & Coordinators
1	TE-1	PAWAR PRAVIN RAGHUNATHRAO	Survey for Design of Sewerage system for Gopalpur Village	Prof. Taralgatti P D (Coordinator), Prof. Londhe S N Prof. Bhaganagare P B
2		PADOLE DIGAMBAR CHANDRAHARSHA		
3		SHIVPUJE SURAJ SUNIL		
4		TARANGE VIJAYKUMAR SHAM		
5		SHINDE SHUBHAM HARI		
6		PUJARI PRAFULL PRASHANT		
7		SHAIKH AMIR SHILAVAR		
8		SURWATE AJINKYA ANAND		
9		RAUT HARSHAD DATTATRAY		
10		RONGE KAPIL BHIMRAO		
11		GHODAKE SACHIN SHIVAJI		
12		MULLA SAQIB SAJID		
13	TE-2	MAHESH CHABUKSWAR	Survey for Design of Water supply system for Gopalpur Village	Prof. Kokare A B (Coordinator), Prof. Sathe R S, Prof. Patil S S
14		Rohit Lengare		
15		/PAWAR RUTUJA BHASKAR		
16		/PARTE KAVITA BHIMA		
17		/VAYADANDE MANISHA BHAUSAHEB		
18		/LAWATE AHILYABAI MOHAN		
19		/MADANE GEETANJALI DATTA		
20		/DESHMUKH PRANJALI SATISH		
21		/GADADE AMRUTA AUDUMBAR		
22		/KEMKAR SAYALI VISHWANATH		
23		/KECHE ANJALI DATTATRAY		
24		/JADHAV ASMITA SANJAY		
25		JADHAV AJIT ANNA		
26	TE-3	JAYKAR SAJAN ANIL	Survey for Design of Sewerage system for Anawali Village	Prof. Surwase S S (Coordinator), Prof. Pawar R S Prof. Pathan S R
27		BADGUDE ROHIT RAMESH		
28		CHATE DNYANESHWAR DINKAR		
29		KAMBLE MANTHAN LAXMAN		
30		BANSODE LAXMAN PANDURANG		
31		/LANGOTE SHWETA ASHOK		
32		/BENARE SHIVANI VIVEK		
33		/CHAVAN ROHINI RAMCHANDRA		
34		/NAGTILAK PRANALI KAMLAKAR		
35		/PRATIKSHA PARBHAT		
36		/BODAKE SANJIVANI SAMBHAJI		
37		/JADHAVAR AISHWARYA DINKAR		
38		/KAMBLE DNYANESHWARI KRUSHNA		
39		/PRANALI SWAMI		
40		DOLLE SANTOSH ISHWAR		
41	TE-4	GANGA SHIVANAND BASAVRAJ		
42		GORE AMIT SAJJAN		
43		Nitin Sawant		
44		GURAV SATYAJEET BHARATRAO		
45		SUSHANT SHINDE		

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Sr. No.	Group No.	NAME OF STUDENT	Project Title	NAME OF GUIDE
46	TE-4	AAFAQ AHMED	Survey for Design of Water supply system for Anawali Village	Prof. Limkar C R (Coordinator), Prof. Deshmukh M G, Prof. Basavraj M
47		ATKALE PRAMOD PRADHAN		
48		MORE SATYAWAN TUKARAM		
49		KALE PRAMOD BIRUDEV		
50		BABAR SWAPNIL BALASAHEB		
51		BHARATI MAHESH PANDURANG		
52		BHOSALE PRAVIN BHARAT		
53		NAGANE RANJEET RAOSAHEB		
54		TARAPURKAR ANIKET VISHWAS		
55		VITEKARI SHUBHAM R		
56		URADE VIJAY JAMBUVANT		
57	TE-5	BURADE ASHISH PRAMOD	Survey for Watershed Management of Anawali Village	Prof. Jagdale S D (Coordinator), Prof. Pawar H R, Prof. Patel Y B
58		BHOSALE ABHAYRAJE RAMESH		
59		BORAMANIKAR AKASH MADHUKAR		
60		CHAVAN MALHARI BHAGWAN		
61		KALBHOR JAGDISH PANDURANG		
62		LAKHOLE SAURABH DINKAR		
63		PAWAR AVINASH VISHNU		
64		SADDALGI SAMARTH SHIVKUMAR		
65		SAVANT PRATIK ANILKUMAR		
66		WAGHMARE VIKRAMSHEEL SUNIL		
67		PAWAR SUBHAS SUKHDEV		
68		/GAIKWAD MAYURI PRATAP		
69		/MALAVE AMRUTA NAGESH		
70		/SARODE PRAJAKTA BABASAHEB		
71		/WAGHMARE ROHINI HANUMANT		
72		/KHUNE POOJA BALASAHEB		

(S.A. GOSAVI)
Project Co-ordinato

(Dr. P.M. Pawar)
H.O.D. Civil Dept.

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COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: 7755990201 **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in **Website.**: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
Accreditated by The Indian Institution of Engineers (India), Kolkata and TCS, Pune.
NAAC Accreditated Institute, **NBA** Accredited All UG Programmes.
ISO 9001:2008 Certified Institute.

Ref No: COEPR/CIVIL/2019-20/

Department of Civil Engineering

Date: 02/01/2020

To,

The Sarpanch,

Gopalpur Grampanchayat

Gopalpur,

Tal: Pandharpur

Subject: Getting permission for the Surveying in Gopalpur Village.

Dear Sir/Madam,

Shri. Vithal Education and Research Institute's College of Engineering, Pandharpur was established in the year 1998 by a group of qualified and experienced Technocrats. Since its inception, the college has been maintaining very high standard of results in the university and is well known for its unique culture and disciplined overall development of the students. All the UG Courses of the college have been accredited by NBA.

As a part of Punyashlok Ahilyadevi Holkar Solapur University's TY(Civil) curriculum we would like to conduct the survey in your village for the design of Sewerage system and water supply system on 09th & 10th Jan 2020. This survey will be very useful at time of execution of water supply or drainage system work in your village.

So you are requested to permit our TY(Civil) students to perform the survey work.

Thanking you,

Yours faithfully,

Dr. P M Pawar

HOD

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P.B No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
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NAAC Accreditated Institute. NBA Accredited All UG Programmes.
ISO 9001:2008 Certified Institute.

Ref No: COEPR/CIVIL/2019-20/

Department of Civil Engineering

Date: 10/01/2020

To,

The Sarpanch,

Gopalpur Grampanchayat

Gopalpur,

Tal: Pandharpur

Subject:- Thanks Letter with immense pleasure.

Dear Sir/Madam,

This is to express our heartfelt gratitude towards you for permitting and supporting our students for performing the surveying work in your village. We will provide you the details of the surveying work for your future help.

Your kind support and helping nature will always keep us inspiring and motivated.

I request the same kind of co-operation in future also.

Thanking you,

Yours faithfully,

Dr. P M Pawar

HOD

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Ref No: COEPR/CIVIL/2019-20

Department of Civil Engineering

Date: 02/01/2020

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The Sarpanch,

Anawali Grampanchayat

Anawali,

Tal: Pandharpur

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ISO 9001:2008 Certified Institute

Ref No: COEPR/CIVIL/2019-20/

Department of Civil Engineering

Date: 10/01/2020

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Anawali Grampanchayat

Gopalpur,

Tal: Pandharpur

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I request the same kind of co-operation in future also.

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Dr. P M Pawar

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SVERI's
College of Engineering, Pandharpur

Civil Engineering Department

Industrial Visit

Class: BE-(Civil)

A.Y.: 2019-2020

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, **NAAC** Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/CIVIL/2019-20/338 Date:- 23/02/202

To,
The General Manager(human resourse),
Maha Metro Rail Corporation Ltd,
Pune.

Subject: Permission to Visit Metro work, Pune

Respected sir,

As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, students of BE civil class are interested to visit Metro work, Pune to study Method of execution , design and construction processes of Metro.

So I kindly request you to permit us for this technical visit and spare one technical person to give information.
Your help in this regard is highly appreciated.

Thanking you in anticipation.

Date of visit:- 03/03/2020

BE student:-45

No of faculty members:-04

Waiting for your reply.

Thanking You,

Yours faithfully,

Dr. P M Pawar
(HOD Civil & Dean Academics)

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Academic Year 2019-20 BE-II

Date:- 27-12-2019

Roll No.	NAME OF STUDENT	Sign.	Roll No.	NAME OF STUDENT	
1	/BHISE KIRAN KISAN		39	GORE SUDHIR PARMESHWAR	
2	/BHOSALE KAJAL BHARAT		40	GURAV SANKET SHRIRANG	
3	/CHIKMANE ANKITA ANIL		41	HONMANE SAGAR SIDDHESHWAR	
4	/DAHIHANDE JYOTI GAURISHANKAR		42	JADHAV VAIBHAV DEVIDAS	
5	/DESHMUKH SNEHA SHIVAJIRAO		43	KADAM SHUBHAM SUNIL	
6	/DESHMUKH SUSHAMA MAHADEV		44	KADAM VIRAJ MARUTI	
7	/DHUMAL HARSHADA PANDURANG		45	KALE VAIBHAV VASANT	
8	/KAMBLE ASHWINI ARVIND		46	KANGUDE YOGESH BALKRISHNA	
9	/KATE PRANITA ANAND		47	LONDHE AVINASH RAJENDRA	
10	/KUMBHAR ANJALI GANPAT		48	MALI PRATHAMESH KRISHANA	
11	/MASAL AISHWARYA NILKHANT		49	MULANI MOIN LATIF	
12	/PAREKAR MRUNALI BIRUDEV		50	MULE AVINASH SITARAM	
13	/PATIL RUTUJA NAGESH		51	NARSALE SUHAS JAYHIND	
14	/PAWALE SHRADDHA RAJENDRA		52	PAWAR SAURABH BABAN	
15	/PAWAR MRUNAL MADHUKAR		53	PAWAR SWAPNIL JITENDRA	
16	/POLAS POOJA PRUSHOTTAM		54	PUJARI HANAMANT SHRISHAIL	
17	/PUJARI PRIYANKA TUKARAM		55	SAWANT GAURAV VITTHAL	
18	/RONGE POOJA BABRUVAHAN		56	SAWANT SHAILESH SHASHIKANT	
19	/SARVAGOD PRACHI JITENDRA		57	SHAIKH SHOAIB SALIM	
20	/SHIKHARE SADHANA NAGNATH		58	SHINDE GANESH MADAN	
21	/SHINDE PRIYADARSHANI RAVINDRA		59	SOUDAGAR PRASAD SHIVAJI	
22	/TEKE MADHURI KISHOR		60	WAGHAMODE ANANDA BALASAHEB	
23	/WAGHMODE PRAJAKTA SOPAN		61	Sarvade Akash Pandurang	
24	/ZENDE PRIYA BRAMHADEO		62	PUJARI PRAKASH RAJKUMAR	
25	/JAGTAP PRAGATI MITU		63	GADADE ABASAHEB DADASO	
26	/DONGARE SHUBHANGI KANHOBARAO		64	GODASE SANDIP SUKHADEO	
27	/ THORAT AISHWARYA ANAND		65	GUNDRE RAMDAS SANJIV	
28	/SARTAPE PRANALI RAJENDRA		66	KULKARNI SHUBHAM RAJENDRA	
29	/VIBHUTE JYOTI ASHOK		67	PATIL PRASAD MANIKRAO	
30	/ Mane Shital Kerappa		68	SANGALE KIRAN	
31	BABAR GANESH SHANKAR		69	GAIKWAD PAWAN ANAND	
32	ATKALE AKASH SHASHIKANT		70	UBALE SANKET	
33	BHARTI SHRINIVAS VISHNU		71	GADAVE AJINKYA VIJAY	
34	Gadase Akash Sureshrao		72	MANE AMIT LAXMAN	
35	GAIKWAD KAPIL VIJAY		73	Mutyal Mahesh	
36	GAIKWAD PRASHANT MANIK		74	JAGTAP KAPIL	
37	GAWADE AJAY SANTOSH		75	Kadam Sagar Tatyyasaheb	
38	Gore Krishna Devidas		76	BANDGAR SHUBHAM SHIVAJI	
B1- 1 to 30	B2- 31 to 53		B3 - 54 to 76		

(Prof. S. R. Pathan)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

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SCHEDULE OF INDUSTRIAL VISIT

Day 0 (03/03/2020) 01.00 AM: Pandharpur- Pune (211 KM)

Day 1 (03/03/2020): at Pune –Bitumen plant (5KM), Metro work (5KM)

Day 2 (04/03/2020):at Mabaleshwer -Building site visit, Rajapuri cave

Day 3 (05/03/2020):at sindhudurg – Sindhudurg port and Rock garden.departure towards Pandharpur.

Class-co-coordinator

Date: 27/02/2020

To,

The Principal/Dean Students,

SVERI's CoE Pandharpur.

Subject: Permission for Industrial Visit of BE Civil.

Respected Sir,

As per curriculum laid down by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for BE Civil (Part II), the subject of Transportation Engg , Traffic Engg and control and Design of concrete structure include visits. In the Processing of same we have sent letter related to Industrial spot. In view of this, we requested you to grant us the permission to arrange visit of BE Civil on 03/03/2020 to 05/03/2020.

Thanking You,

Prof. S. R .Pathan
Class-co-coordinator

Subject Teacher

Dr.P.M.Pawar
HOD-Civil

- permitted for Industrial Visit
- as per schedule 'A' attached
- Night travel be avoided

27/2/2020

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE S
COLLEGE OF ENGINEERING

PANDHARPURGopalpur- RanjaniRoad, Gopalpur, P.B. No.54 Tal – Pandharpur – 413304 Dist – Solapur (Maharashtra) Ph :02186 325782 Fax : 02186 225082
(Approved by AICTE, New Delhi and MSBTE Mumbai)

Industrial Visit

BE Civil (2019-20)

Route: - Pandharpur – kholapur -Sindhudurg-Pandharpur (App.: 663Km)

Place: - Departure from Pandharpur

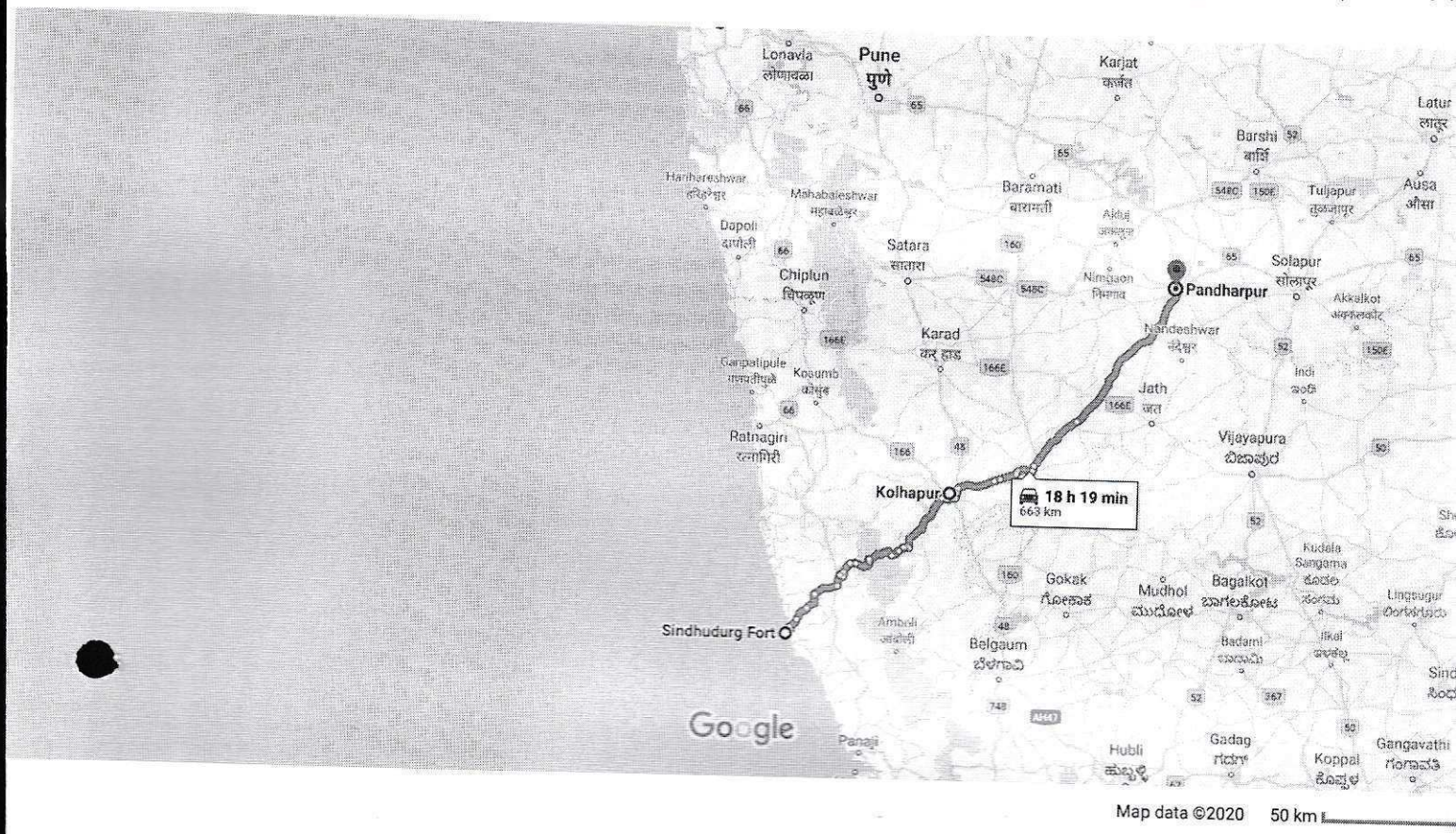
Day	Place to visit	Subject
03/03/2020	Departure from Pandharpur towards kholapur At 01:00AM. Arrival at kholapur 6:00AM (179 Km) via sangali.	
1st Day 03/03/2020 2hrs for fresh and breakfast	Hault to **Radhanagari dam** 01:00PM Departure for lunch Departure towards **shahupalace ,rankala .**	**CPTP**
# Hault and dinner	Hault At kholapur	

2nd Day 04/03/2020	06:00am Departure towards **Sindudurge port** Departure for lunch at 1.00pm. Departure towards **Rock garden**	1) **Structure of port and its necessity.** **2)Study of rock masonry structure**
#Hault and Dinner	departure towards Hault.	CPTP and GEOLOGY
3rd Day 05/03/2020	Departure toward Ancient temple,market. departure towards Pandharpur at 1.00PM 10.00 PM arrival time.	1) **Structure of Ancient structure and its necessity.** SWHM

HoD Civil

9/3/2020

Google Maps Pandharpur, Maharashtra 413304 to Pandharpur, Maharashtra 413304 Drive 663 km, 18 h 19 m



Map data ©2020 50 km

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S

COLLEGE OF ENGINEERING, PANDHARPUR

Department of Civil Engineering

Academic Year 2019-20 BE-II

Date:- 28-02-2020

Intersted student list for Industrial visit Schedule from 3-3-2020 to 5-3-20

Roll No.	NAME OF STUDENT	Sign	Roll No.	NAME OF STUDENT	
1	/BHISE KIRAN KISAN		39	GORE SUDHIR PARMESHWAR	
2	/BHOSALE KAJAL BHARAT		40	GURAV SANKET SHRIRANG	
3	/CHIKMANE ANKITA ANIL		41	HONMANE SAGAR SIDDHESHWAR	
4	/DAHIHANDE JYOTI GAURISHANKAR		42	JADHAV VAIBHAV DEVIDAS	
5	/DESHMUKH SNEHA SHIVAJIRAO		43	KADAM SHUBHAM SUNIL	
6	/DESHMUKH SUSHAMA MAHADEV		44	KADAM VIRAJ MARUTI	
7	/DHUMAL HARSHADA PANDURANG		45	KALE VAIBHAV VASANT	
8	/KAMBLE ASHWINI ARVIND		46	KANGUDE YOGESH BALKRISHNA	
9	/KATE PRANITA ANAND		47	LONDHE AVINASH RAJENDRA	
10	/KUMBHAR ANJALI GANPAT		48	MALI PRATHAMESH KRISHANA	
11	/MASAL AISHWARYA NILKHANT		49	MULANI MOIN LATIF	
12	/PAREKAR MRUNALI BIRUDEV		50	MULE AVINASH SITARAM	
13	/PATIL RUTUJA NAGESH		51	NARSALE SUHAS JAYHIND	
14	/PAWALE SHRADDHA RAJENDRA		52	PAWAR SAURABH BABAN	
15	/PAWAR MRUNAL MADHUKAR		53	PAWAR SWAPNIL JITENDRA	
16	/POLAS POOJA PRUSHOTTAM		54	PUJARI HANAMANT SHRISHAIL	
17	/PUJARI PRIYANKA TUKARAM		55	SAWANT GAURAV VITTHAL	
18	/RONGE POOJA BABRUVAHAN		56	SAWANT SHAILESH SHASHIKANT	
19	/SARVAGOD PRACHI JITENDRA		57	SHAIKH SHOAIB SALIM	
20	/SHIKHARE SADHANA NAGNATH		58	SHINDE GANESH MADAN	
21	/SHINDE PRIYADARSHANI RAVINDRA		59	SOUDAGAR PRASAD SHIVAJI	
22	/TEKE MADHURI KISHOR		60	WAGHAMODE ANANDA BALASAHEB	
23	/WAGHMODE PRAJAKTA SOPAN		61	Sarvade Akash Pandurang	
24	/ZENDE PRIYA BRAMHADEO		62	PUJARI PRAKASH RAJKUMAR	
25	/JAGTAP PRAGATI MITU		63	GADADE ABASAHEB DADASO	
26	/DONGARE SHUBHANGI KANHOBARAO		64	GODASE SANDIP SUKHADEO	
27	/ THORAT AISHWARYA ANAND		65	GUNDRE RAMDAS SANJIV	
28	/SARTAPE PRANALI RAJENDRA		66	KULKARNI SHUBHAM RAJENDRA	
29	/VIBHUTE JYOTI ASHOK		67	PATIL PRASAD MANIKRAO	
30	/ Mane Shital Kerappa		68	SANGALE KIRAN	
31	BABAR GANESH SHANKAR		69	GAIKWAD PAWAN ANAND	
32	KHILARE AKASH SHASHIKANT		70	UBALE SANKET	
33	BHARTI SHRINIVAS VISHNU		71	GADAVE AJINKYA VIJAY	
34	Gadase Akash Sureshrao		72	MANE AMIT LAXMAN	
35	GAIKWAD KAPIL VIJAY		73	Mutyal Mahesh	
36	GAIKWAD PRASHANT MANIK		74	JAGTAP KAPIL	
37	GAWADE AJAY SANTOSH		75	Kadam Sagar Tatyyasaheb	
38	Gore Krishna Devidas		76	Bandegar shubham b.	

(Prof. S. R. Pathrami)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: 7755990201 **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in **Website.**: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
Accreditated by The Indian Institution of Engineers (India), Kolkata and TCS, Pune.
NAAC Accreditated Institute, **NBA** Accredited All UG Programmes,
ISO 9001:2008 Certified Institute.

Date:- 02/03/2020

Office Order

Following faculty members has deputed for Industrial visit from 03/03/2020 to 05/03/2020. So you are requested to act accordingly.

Sr. No.	Class	Name of Faculty	Sign
01	B.E.	Prof. C.R.Limkar	
02		Prof. S.R.Pathan	
03		Ms.C.R.Abhangrao	
04		Ms.T.S.Thite	

Thanking you.

Yours faithfully,

HOD CIVIL ENGG.

COEDA/CIVIL/2019-20/339

Date:- 03/03/2020

To,
Executive Engineer,
Radhanagari Dam,
Kolhapur

Subject: Permission to Visit Radhanagari Dam, Kolhapur.

Respected sir,
As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, students of BE civil class are interested to visit Radhanagari Dam, Kolhapur to study components of Dam,Hydro Power Project.
So I kindly request you to permit us for this technical visit and spare one technical person to give information.
Your help in this regard is highly appreciated.
Thanking you in anticipation.
Date of visit:- 03/03/2020
BE student:-48
No of faculty members:-04
Waiting for your reply.

Thanking You,

Yours faithfully,

(HOD Civil) (VSK)

SVERI's
College of Engineering, Pandharpur

Civil Engineering Department

Industrial Visit

Class: TE (Civil)

A.Y.: 2019-2020

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Academic Year 2019-20 TE- I

Industrial Visit Students List

Payment Towards Industrial Visit of T.E.(CIVIL) Students For The Academic Year2019-2020. Visit date on 31/08/2019 to 03/09/201 9. Students 47 X 600 = 28200.

Sr.no	NAME OF STUDENT	Amount	Sign
1	BENARE SHIVANI VIVEK	600	
2	BODAKE SANJIVANI SAMBHAJI	600	
3	CHAVAN ROHINI RAMCHANDRA	600	
4	DESHMUKH PRANJALI SATISH	600	
5	GADADE AMRUTA AUDUMBAR	600	
6	GAIKWAD MAYURI PRATAP	600	
7	JADHAV ASMITA SANJAY	600	
8	KECHE ANJALI DATTATRAY	600	
9	KEMKAR SAYALI VISHWANATH	600	
10	Langote Shweta Ashok	600	
11	NAGTILAK PRANALI KAMLAKAR	600	
12	VAYADANDE MANISHA BHAUSAHEB	600	
13	MALAVE AMRUTA NAGESH	600	
14	SARODE PRAJAKTA BABASAHEB	600	
15	WAGHMARE ROHINI HANUMANT	600	
16	SWAMI PRANALI SHASHIKANT	600	
17	Parbat Pratiksha Prabhakar	600	
18	AAFAQ AHMED	600	
19	ATKALE PRAMOD PRADHAN	600	
20	BABAR SWAPNIL BALASAHEB	600	
21	BADGUDE ROHIT RAMESH	600	
22	BANSODE LAXMAN PANDURANG	600	
23	BHOSALE PRAVIN BHARAT	600	
24	BURADE ASHISH PRAMOD	600	
25	CHAFE DNYANESHWAR DINKAR	600	
26	DOLLE SANTOSH ISHWAR	600	
27	SAWANT NITIN RAJA	600	
28	GANGA SHIVANAND BASAVRAJ	600	
29	JADHAV AJIT ANNA	600	
30	Kale Pramod Birudev	600	
31	More Satyawan Tukaram	600	
32	Shinde Sushant Ramesh	600	
33	PAWAR PRAVIN RAGHUNATHRAO	600	
34	PUJARI PRAFULL PRASHANT	600	
35	SHAIKH AMIR SHILAVAR	600	
36	SHINDE SHUBHAM HARI	600	
37	SHIVPUJE SURAJ SUNIL	600	
38	SURWASE AJINKYA ANAND	600	
39	VITEKARI SHUBHAM RAVINDRA	600	
40	URADE VIJAY JAMBUVANT	600	
41	CHAVAN MALHARI BHAGWAN	600	
42	KALBHOR JAGDISH PANDURANG	600	
43	PAWAR AVINASH VISHNU	600	
44	SADDAI GI SAMARTH SHIVKUMAR	600	
45	SAVANT PRATIK ANILKUMAR	600	
46	Pawar Subhash Sukhadev	600	
47	Bhosale Abhayraje Ramesh	600	
	TOTAL=	28200	
	(Rs.Twenty Eight Thousand Two Hundred Only)		

Prof.S.M. Patil
Class Co-ordinate

Dr.P.M.Pawar
HOD Civil Dept.

Mr. R.G.Zarkar
REGISTRAR

Dr.B.P.Ronge
PRINCIPAL

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Department Of Civil Engineering

Class: - TE Civil

Expenditure of industrial visit Academic Year 2019-20 SEM I

Sr. No	Particular	Amount
1.	Travelling	69750
2.	Toll	1600
3.	Hault	18240
4.	Parking	80
5.	Entry Fee	8725
6.	RTO State Crossing	18000+2800
7.	Driver Lunch,Breakfast ,Dinner	1728
	Total Amount	120923/-

Prof .S.M.PATIL

Class-co-Ordinator

Dr P M Pawar

HOD

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Date: 26/8/2019

To,

The Principal/Dean Students,

SVERI's CoE Pandharpur.

Subject: Permission for Industrial Visit of TE Civil.

Respected Sir,

As per curriculum laid down by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for TE Civil (Part II), the subject of Geotechnical Engg I, Water Resource Engineering-II, Building Planning Design and Drawing include visits. In the Processing of same we have sent letter related to Industrial spot. In view of this, we requested you to grant us the permission to arrange visit of TE Civil on 31/8/2019 to 3/9/2019.

Thanking You,

Prof. S M Patil
Class-co-ordinator

Prof.C R Limkar
Subject-Teacher

Prof A B Kokare
Subject-Teacher

Prof. P S Lachyan
Subject-Teacher

Dr. P M Pawar
HoD-Civil Engg.

permitted for industrial visit as per schedule. A.S.
Instructions B.

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SCHEDULE OF INDUSTRIAL VISIT

Day 0 (31/8/2019) 11.00 PM: Pandharpur- Hyderabad (410 KM)

Day 1 (1/8/2019): Birla Science Museum (3KM), Golconda Fort (10KM)

Day 2 (2/8/2019): Building site visit, Charminar and then Salar Jung Museum

Day 3 (3/8/2019): Nagarjuna Sagar Dam and then towards Pandharpur.

Patil

Prof. S M Patil
Class-co-coordinator

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SCHEDULE OF INDUSTRIAL VISIT

Day 0 (31/8/2019) 11.00 PM: Pandharpur- Hyderabad (410 KM)

Day 1 (1/8/2019): Birla Science Museum (3KM), Golconda Fort (10KM)

Day 2 (2/8/2019): Building site visit, Charminar and then Salar Jung Museum

Day 3 (3/8/2019): Nagarjuna Sagar Dam and then towards Pandharpur.

Patil

Prof. S M Patil
Class-co-coordinator

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Academic Year 2019-20 TE- I

Date:- 26-08-2019

Industrial Visit

Roll No.	NAME OF STUDENT	Sign.	Roll No.	NAME OF STUDENT	Sign.
T-1	BENARE SHIVANI VIVEK		T-41	GURAV SATYAJEET BHARATRAO	
T-2	BHOSALE KAJAL SANJAY		T-42	JADHAV AJIT ANNA	
T-3	BODAKE SANJIVANI SAMBHAJI		T-43	JAYKAR SAJAN ANIL	
T-4	CHAVAN ROHINI RAMCHANDRA		T-44	KALE PRAMOD BIRUDEV	
T-5	DESHMUKH PRANJALI SATISH		T-45	KAMBLE MANTHAN LAXMAN	
T-6	GADADE AMRUTA AUDUMBAR		T-46	MORE SATYAWAN TUKARAM	
T-7	GAIKWAD MAYURI PRATAP		T-47	MULLA SAQIB SAJID	
T-8	GAIKWAD SRUSHTI JALINDAR		T-48	Shinde Sushant	
T-9	JADHAV ASMITA SANJAY		T-49	CHABUKSWAR MAHESH	
T-10	JADHAVAR AISHWARYA DINKAR		T-50	NAGANE RANJEET RAOSAHEB	
T-11	KAMBLE DNYANESHWARI KRUSHNA		T-51	PADOLE DIGAMBAR CHANDRASHEKHA	X
T-12	KECHE ANJALI DATTATRAY		T-52	PAWAR PRAVIN RAGHUNATHRAO	
T-13	KEMKAR SAYALI VISHWANATH		T-53	PUJARI PRAFULL PRASHANT	
T-14	KHUNE POOJA BALASAHEB		T-54	RAUT HARSHAD DATTATRAY	
T-15	LANGOTE SHWETA ASHOK	X	T-55	RONGE KAPIL BHIMRAO	
T-16	MADANE GEETANJALI DATTA		T-56	SHAIKH AMIR SHILAVAR	
T-17	NAGTILAK PRANALI KAMLAKAR		T-57	SHINDE SHUBHAM HARI	
T-18	PARSE KAVITA BHIMA		T-58	SHIVPUJE SURAJ SUNIL	
T-19	PAWAR RUTUJA BHASKAR		T-59	SURWASE AJINKYA ANAND	
T-20	VAYADANDE MANISHA BHAUSAHEB		T-60	TARANGE VIJAYKUMAR SHAM	
T-21	LAWATE AHILYABAI MOHAN		T-61	TARAPURKAR ANIKET VISHWAS	
T-22	MALAVE AMRUTA NAGESH		T-62	GHODAKE SACHIN SHIVAJI	
T-23	SARODE PRAJAKTA BABASAHEB		T-63	VITEKARI SHUBHAM RAVINDRA	
T-24	WAGHMARE ROHINI HANUMANT		T-64	URADE VIJAY JAMBUVANT	
T-25	SWAMI PRANALI SHASHIKANT		T-65	BHOSALE ABHAYRAJE RAMESH	
T-26	Parbat Pratiksha		T-66	BORAMANEKAR AKASH SUDHIR KAV	
T-27	AAFAQ AHMED		T-67	CHAVAN MALHARI BHAGWAN	
T-28	ATKALE PRAMOD PRADHAN		T-68	KALBHOR JAGDISH PANDURANG	
T-29	BABAR SWAPNIL BALASAHEB		T-69	LAKHOLE SAURABH DINKAR	
T-30	BADGUDE ROHIT RAMESH		T-70	PAWAR AVINASH VISHNU	
T-31	BANSODE LAXMAN PANDURANG		T-71	SADDALGI SAMARTH SHIVKUMAR	
T-32	BHARATI MAHESH PANDURANG	X	T-72	SAVANT PRATIK ANIL KUMAR	
T-33	BHOSALE PRAVIN BHARAT		T-73	WAGHMARE VIKRAMSHEEL SUNIL	
T-34	BURADE ASHISH PRAMOD		T-74	Pawar Subhash Sukhadev	
T-35	CHATE DNYANESHWAR DINKAR		T-75	Lengare Rohit	
T-36	DOLLE SANTOSH ISHWAR		T-76		
T-37	SAWANT NITIN		T-77		
T-38	GANGA SHIVANAND BASAVRAJ		T-78		
T-39	GAVALI SAURABH ASHOK		T-79		
T-40	GORE AMIT SAJJAN		T-80		

T-1:- 01 to 19
T-2:- 20 to 38
T-3:- 39 to 57
T-4:- 57 to Onwards

(Prof. S. M. Patil)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: 7755990201 Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in Website.: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
Accreditated by The Indian Institution of Engineers (India), Kolkata and TCS, Pune.
NAAC Accreditated Institute, NBA Accredited All UG Programmes,
ISO 9001:2008 Certified Institute.

Date:- 28/08/2019

Office Order

Following faculty members has deputed for Industrial visit from 31/08/2019 to 3/09/2019. So you are requested to act accordingly.

Sr. No.	Class	Name of Faculty	Sign
1.	T.E.	Prof. C.R.Limkar	
2.		Prof.S M Patil	
3.		Prof.A.B Kokare	
4.		Prof./P S Lachyan	

Thanking you.

Yours faithfully,

(Dr. P.M.Pawar)
HOD CIVIL ENGG.

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Department of Civil Engineering

Academic Year 2019-20 TE- 1

Date:- 26-08-2019

Industrial Visit

Roll No.	NAME OF STUDENT	Sign.	Roll No.	NAME OF STUDENT	Sign.
T-1	/BENARE SHIVANI VIVEK		T-41	GURAV SATYAJEET BHARATRAO	
T-2	/BHOSALE KAJAL SANJAY		T-42	JADHAV AJIT ANNA	
T-3	/BODAKE SANJIVANI SAMBHAJI		T-43	JAYKAR SAJAN ANIL	
T-4	/CHAVAN ROHINI RAMCHANDRA		T-44	KALE PRAMOD BIRUDEV	
T-5	/DESHMUKH PRANJALI SATISH		T-45	KAMBLE MANTHAN LAXMAN	
T-6	/GADADE AMRUTA AUDUMBAR		T-46	MORE SATYAWAN TUKARAM	
T-7	/GAIKWAD MAYURI PRATAP		T-47	MULLA SAQIB SAJID	
T-8	/GAIKWAD SRUSHTI JALINDAR		T-48	Shinde Sushant	
T-9	/JADHAV ASMITA SANJAY		T-49	CHABUKSWAR MAHESH	
T-10	/JADHAVAR AISHWARYA DINKAR		T-50	NAGANE RANJEET RAOSAHEB	
T-11	/KAMBLE DNYANESHWARI KRUSHNA		T-51	PADOLE DIGAMBAR CHANDRAHARSHA	
T-12	/KECHE ANJALI DATTATRAY		T-52	PAWAR PRAVIN RAGHUNATHRAO	
T-13	/KEMKAR SAYALI VISHWANATH		T-53	PUJARI PRAFULL PRASHANT	
T-14	/KHUNE POOJA BALASAHEB		T-54	RAUT HARSHAD DATTATRAY	
T-15	/LANGOTE SHWETA ASHOK		T-55	RONGE KAPIL BHIMRAO	
T-16	/MADANE GEETANJALI DATTA		T-56	SHAIKH AMIR SHILAVAR	
T-17	/NAGTILAK PRANALI KAMLAKAR		T-57	SHINDE SHUBHAM HARI	
T-18	/PARSE KAVITA BHIMA		T-58	SHIVPUJE SURAJ SUNIL	
T-19	/PAWAR RUTUJA BHASKAR		T-59	SURWASE AJINKYA ANAND	
T-20	/VAYADANDE MANISHA BHAUSAHEB		T-60	TARANGE VIJAYKUMAR SHAM	
T-21	/LAWATE AHILYABAI MOHAN		T-61	TARAPURKAR ANIKET VISHWAS	
T-22	/MALAVE AMRUTA NAGESH		T-62	GHODAKE SACHIN SHIVAJI	
T-23	/SARODE PRAJAKTA BABASAHEB		T-63	VITEKARI SHUBHAM RAVINDRA	
T-24	/WAGHMARE ROHINI HANUMANT		T-64	URADE VIJAY JAMBUVANT	
T-25	/SWAMI PRANALI SHASHIKANT		T-65	BHOSALE ABHAYRAJE RAMESH	
T-26	/Parbat Pratiksha		T-66	BORAMANIKAR AKASH SUDHIR KA	
T-27	AAFAQ AHMED		T-67	CHAVAN MALHARI BHAGWAN	
T-28	ATKALE PRAMOD PRADHAN		T-68	KALBHOR JAGDISH PANDURANG	
T-29	BABAR SWAPNIL BALASAHEB		T-69	LAKHOLE SAURABH DINKAR	
T-30	BADGUDE ROHIT RAMESH		T-70	PAWAR AVINASH VISHNU	
T-31	BANSODE LAXMAN PANDURANG		T-71	SADDALGI SAMARTH SHIVKUMAR	
T-32	BHARATI MAHESH PANDURANG		T-72	SAVANT PRATIK ANIL KUMAR	
T-33	BHOSALE PRAVIN BHARAT		T-73	WAGHMARE VIKRAMSHEEL SUNIL	
T-34	BURADE ASHISH PRAMOD		T-74	Pawar Subhash Sukhadev	
T-35	CHATE DNYANESHWAR DINKAR		T-75	Lengare Rohit	
T-36	DOLLE SANTOSH ISHWAR		T-76		
T-37	SAWANT NITIN		T-77		
T-38	GANGA SHIVANAND BASAVRAJ		T-78		
T-39	GAVALI SAURABH ASHOK		T-79		
T-40	GORE AMIT SAJJAN		T-80		

T-1:- 01 to 19
T-2:- 20 to 38
T-3:- 39 to 57
T-4:- 57 to Onwards

(Prof. S. M. Patil)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE S
COLLEGE OF ENGINEERING

PANDHARPURGopalpur- RanjaniRoad, Gopalpur, P.B. No.54 Tal - Pandharpur – 413304 Dist – Solapur (Maharashtra) Ph :02186 325782 Fax : 02186 225082
(Approved by AICTE, New Delhi and MSBTE Mumbai)

Industrial Visit

TE Civil (2019-20)

Route: - Pandharpur – Solapur-Hyderabad –Solapur-Pandharpur (Appx: 1100Km)

Place: - Departure from Pandharpur

Day	Place to visit	Subject
31/08/2019	Departure from Pandharpur towards Hyderabad At 10:30PM. Arrival at Hyderabad 8:00AM (410 Km) via Bidar.	
1st Day 01/09/2019 2hrs for fresh and breakfast	08:00am – 10:00am Hault to Birla Science Museum(3KM) 01:00PM Departure for lunch Departure towards GolcondaFort (10KM)	WRE-II (Hydraulic structures). DOSS, Architectural planning of buildings. Acoustic structures
# Hault and dinner	At 07:00PM departure towards Dinner from 08:00pm to 10:00pm Hault Youth Hostel,Secundarabad	

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2nd Day 02/09/2019	09:00am Departure towards Building site visit Departure for lunch Departure towards Charminar and then Salar Jung Museum	BPDD
#Hault and Dinner	Hault Youth Hostel,Secundarabad	
3rd Day 03/09/2019	Departure towards Nagarjuna Sagar Dam ~~At 05:00pm~~ 9am departure towards Hyderabad at 2pm. Dinner from 08:00PM to 10:00PM departure towards Pandharpur 6.00 AM arrival time	1) Structure of dam and its component parts. 2)Electricity generation Hydroelectric Power Plant

- Night Journey be avoided ~~as much as~~ & if unavoidable, care be taken
- Special care be taken near Dam sites
- Return Journey must be started on 03/09/19 in such a way that Students & staff will reach Pandharpur upto evening on same day.

A

B

27/8/19

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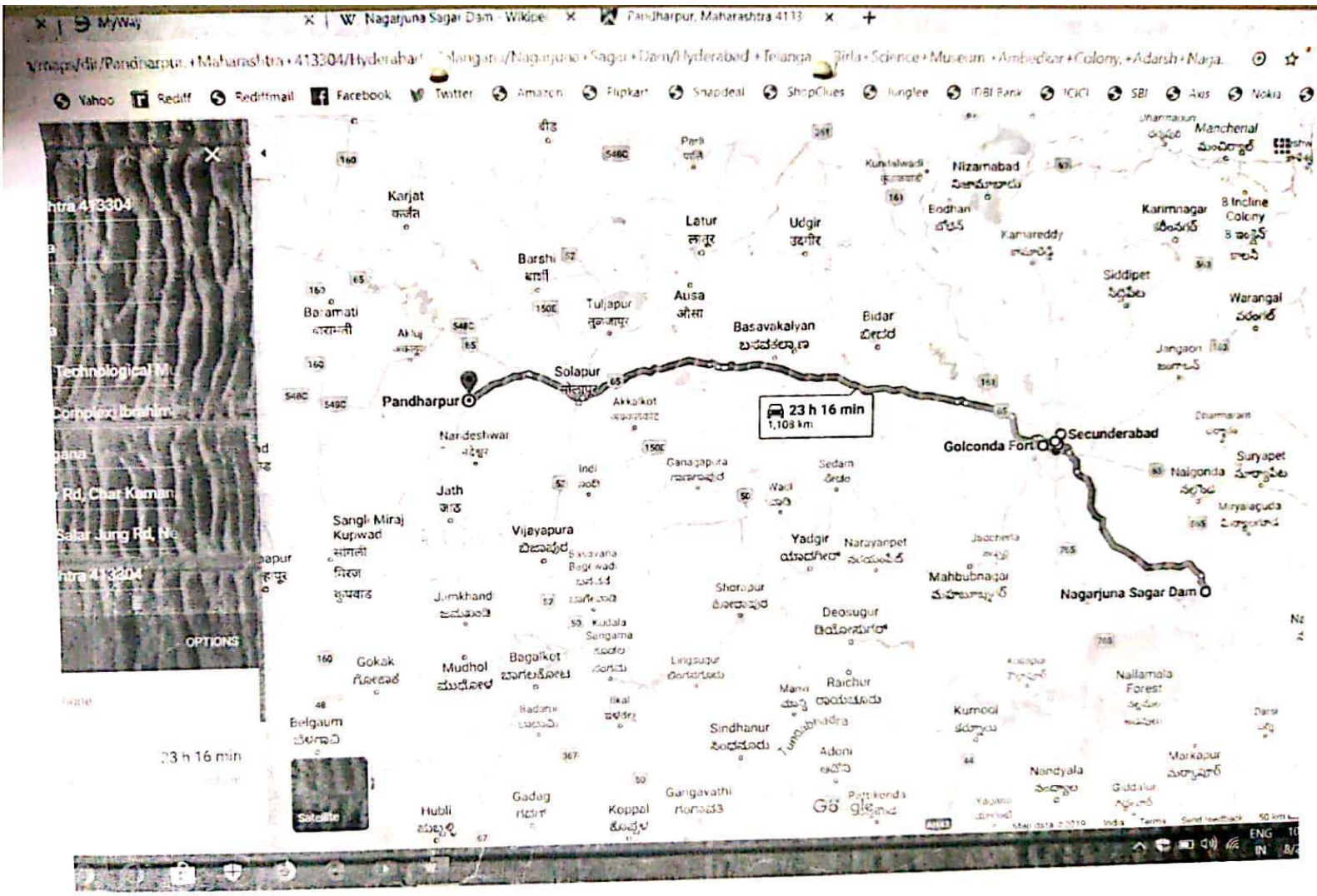

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SVERI
Engineering for Excellence

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, **NAAC** Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/CIVIL/2019-20/27) Date:- 28/8/2019

To,
Chief Engineer,
Nagarjuna Sagar Dam Circle,
Hill Colony, Nalconda
Hyderabad

Subject: Permission to Visit Nagarjuna Sagar Dam, Nalconda

Respected sir,
As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, students of *TE civil* class are interested to visit Nagarjuna Sagar Dam,Nalconda to study components of Dam,Hydro Power Project.
So I kindly request you to permit us for this technical visit and spare one technical person to give information.
Your help in this regard is highly appreciated.
Thanking you in anticipation.
Date of visit:- 03/09/2019
TE student:-45
No of faculty members:-05
Waiting for your reply.

Thanking You,

Yours faithfully,
Dr. P M Pawar
(HOD Civil & Dean Academics)

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

ISO 9001-2000 Certified Institute & Accredited by Institutes of Engineers, India,
Gopalpur -Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra) Ph.: (02186) 225083, Fax: (02186) 225082.
(NBA Accredited and NACC Accredited)
Approved by AICTE, New Delhi and affiliated to Solapur University, Solapur)
E-mail : coe@sveri.ac.in Website: www.sveri.ac.in

Date: 07/09/2019

To,

The Head Civil Engg.Dept

SVERI's COE Pandharpur.

Subject: T.E. Civil Industrial visit report of academic year 2019-2020 SEM-I.

Respected sir,

We have organized an industrial visit for the class T.E. Class From date. 31/8/2019 to 04/9/2019.Under this industrial visit we have made arrangement to give the practical expose to the students for the following points and ANNEXURE-I is attached with important photographs during visit,

1)Birla Science Museum : we have visited Birla Science Museum which is an Indian science museum located in Hyderabad, India. Constructed by civil engineer P. A. Singaravelu, it comprises a planetarium, museum, science centre, art gallery as well as a dinosaurium. The museum itself was the second phase of the science centre when it opened in 1990.

2) Nagarjun sagar Dam: We have visited Nagarjun sagar dam and students got practical approach of components of dam and Hydropower generation. Nagarjuna Sagar Dam is a masonry dam across the Krishna river at Nagarjuna Sagar which straddles the border between Nalgonda district, Telangana and Guntur district, Andhra Pradesh. Constructed between 1955 and 1967, the dam created a water reservoir with gross storage capacity of 11.472 billion cubic metres.and Height 124 metres (407 ft) from river level.

3) Golconda Fort : we have visited Golconda Fort Architectural and Acoustic wonder in Hyderabad. In the 16th century, Golkonda was the capital and fortress city of the QutbShahi kingdom, near Hyderabad. The city and fortress are built on a granite hill that is 120 meters (400 ft) high and is surrounded by massive crenelated ramparts.

Yours Sincerely

Mr.S.M.Patil

Class Coordinator

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ANNEXURE-I

Important photographs during industrial visit and description.



The photograph shows Golconda Fort at Hyderabad, Telangana.

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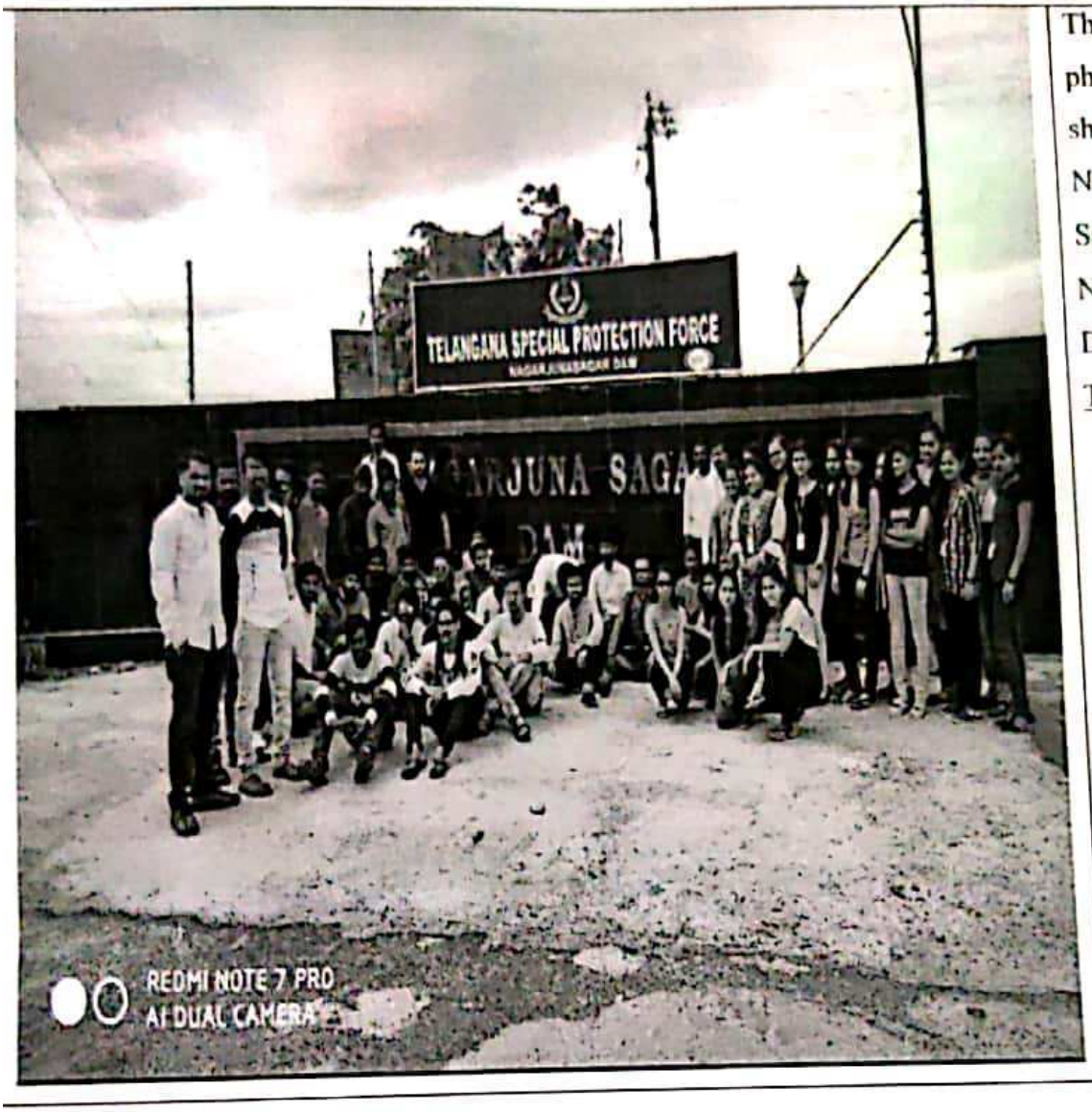


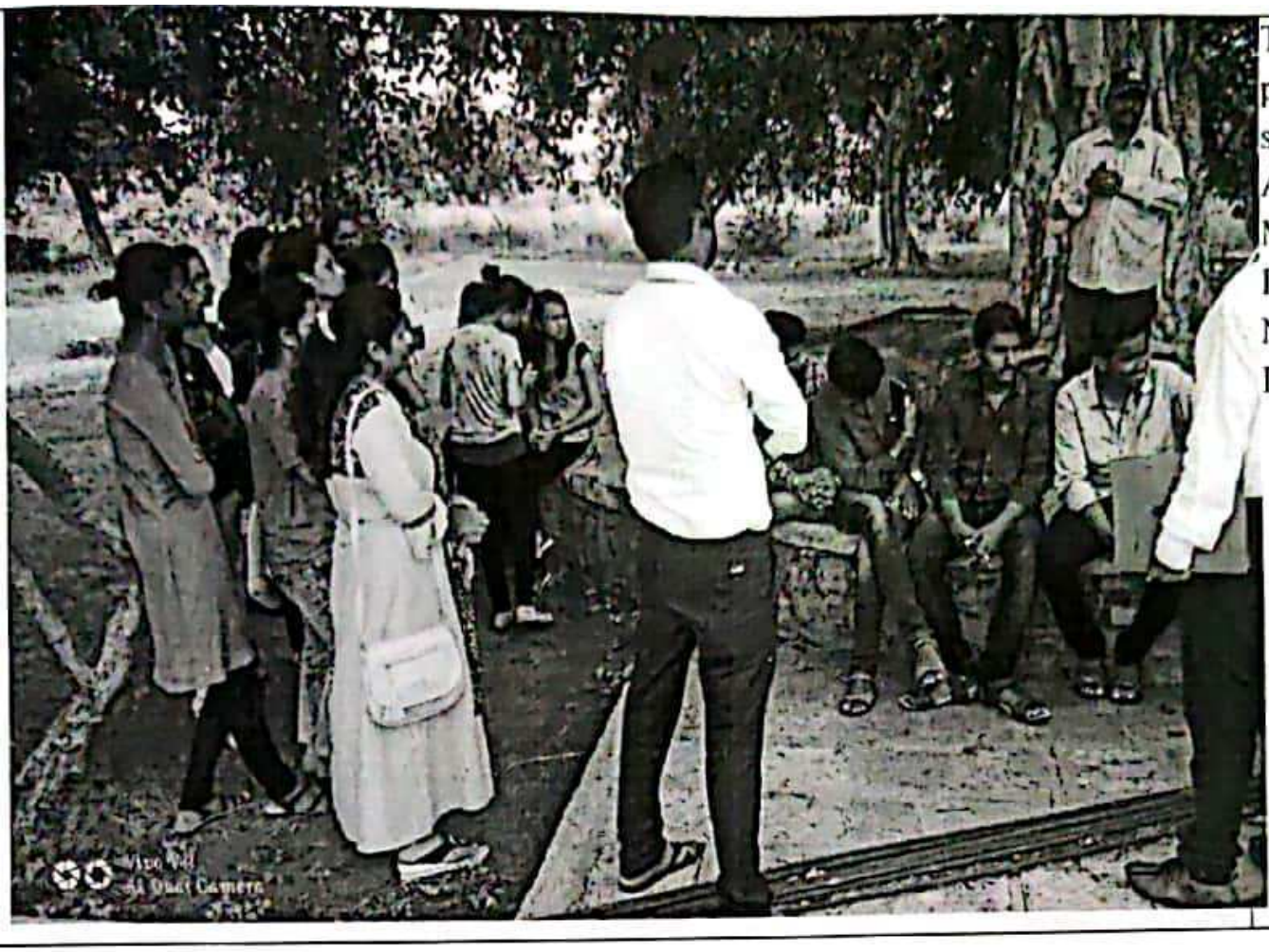
The photograph shows Nagarjun Sagar Dam at Nalgonda Dist. Telangana

Scanned by CamScanner



The photograph shows Hussain Sagar Lake at Hyderabad

Scanned by CamScanner



The photograph shows Archeological Museum in I Land of Nagarjun Dam.

సాగర్‌లో మహారాష్ట్ర ఇంజనీరింగ్ విద్యార్థుల సందడి



నాగార్జునకొండ సింహశీయంలోని బుద్ధ విగ్రహం వద్ద విద్యార్థులు

నాగార్జునసాగర్ : మహారాష్ట్రలోని శ్రీవిఠల్ ఎడ్యుకేషన్ అండ్ రిసర్చ్ ఇనిస్టిట్యూషన్స్ ఇంజనీరింగ్ కాలేజ్ విద్యార్థులు అంతర్జాతీయ పర్యాటక కేంద్రమైన నాగార్జునసాగర్‌ను మంగళవారం సందర్శించారు. ఎడ్యుకేషన్ టూర్‌లో భాగంగా సాగర్‌డ్యాం నిర్మాణం, క్రస్ట్‌గేట్ల అమరికను పరిశీలించారు. ప్రాజెక్టు వివరాలను అడిగి తెలుసుకున్నారు. అనంతరం తెలంగాణ లాంచీలో నాగార్జునకొండకు వెళ్లారు. అక్కడ మ్యూజియంలోగల అలనాటి నాగరికత విశేషాలను తెలుసుకున్నారు. బుద్ధుడి విగ్రహాలు, శిలాశాసనాలు పరిశీలించారు. కొండపైగల సింహశీయం వద్దగల నిలువెత్తు బుద్ధుడి విగ్రహం వద్ద విద్యార్థులంతా ఫొటోలు దిగారు. వీరికి పర్యాటకశాఖ గైడ్ సత్యనారాయణ వివరాలను తెలియజేశారు. వీరివెంట అసిస్టెంట్ ప్రొఫెసర్లు చేతన్, స్మిత్‌పాటిల్ తదితరులు ఉన్నారు.

తి, సంప్రదాయాలు ప్రతిబింబిం
నిర్వహించుకోవాలని కోరారు. ఎమె
భూపాల్‌రెడ్డి మాట్లాడుతూ న
ఘనంగా నిర్వహించుకోవాలని,

పలువురికి ఎం

నల్లగొండ : జిల్లా పరిషత్ పరిధిలో పనిచేస్తున్న మండల పంచాయతీ అధికారులు, పర్యవేక్షకులకు పదోన్నతులు కల్పించారు. పంచాయతీ రాజ్ కమిషనర్ ఈ మేరకు వారికి పదోన్నతులు కల్పిస్తూ జాబితాను విడుదల చేశారు. జిల్లాలో 11 మందికి ఎంపీడీఓలుగా పదోన్నతులు కల్పించి జిల్లాలోనే పోస్టింగ్ ఇచ్చారు. ఒకరు హైదరాబాద్ నుంచి పదోన్నతిపై నల్లగొండకు రాగా, చండూరులో పనిచేస్తు నరేందర్ ఇటీవల సోషల్ మీ

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ఇంజినీరింగ్ విద్యార్థుల సందర్శన

సాగర్ డ్యాం వద్ద ఇంజినీరింగ్ విద్యార్థులు

Our industrial visit at Nagarjuna sagar Dam is published in their daily newspaper.At Telangana.

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INDUSTRIAL VISIT

T.E CIVIL

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INDEX

- Pandharpur
- Birla Science Museum, Hyderabad
- Golconda Fort, Hyderabad
- Salar Jung Museum, Hyderabad
- Charminar
- Nagarjuna Sagar Dam
- Pandharpur

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Golconda fort



Golconda Fort is a very large fort consisting of temples, mosques, palaces, halls, apartments and other structures. The fort is spread in around 11km area and has beautiful architecture. The fort is divided into four forts each having apartments. The ringing phones, the slamming doors, the screeching chairs, Aah! unending noise all around. In the cacophony of different deafening sounds in today's world, it is hard to believe for you and me that even a sound of clap can be used as a signal. But the acoustic marvels of India like Golconda Fort is like an awakening. Ibrahim Quli Qutb Shah, the King who built the Golkonda Fort was believed to be the expert of physics. The anecdote of his intelligence was quite evident to me from the very first sight of the fort. When you enter the fort its acoustic effects are all ready to astound you to the deepest core. Golconda Fort, also known as Golkonda or Golla Konda, is a fortified citadel and an early capital city of the Qutb Shahi dynasty, located in Hyderabad, Telangana, India.

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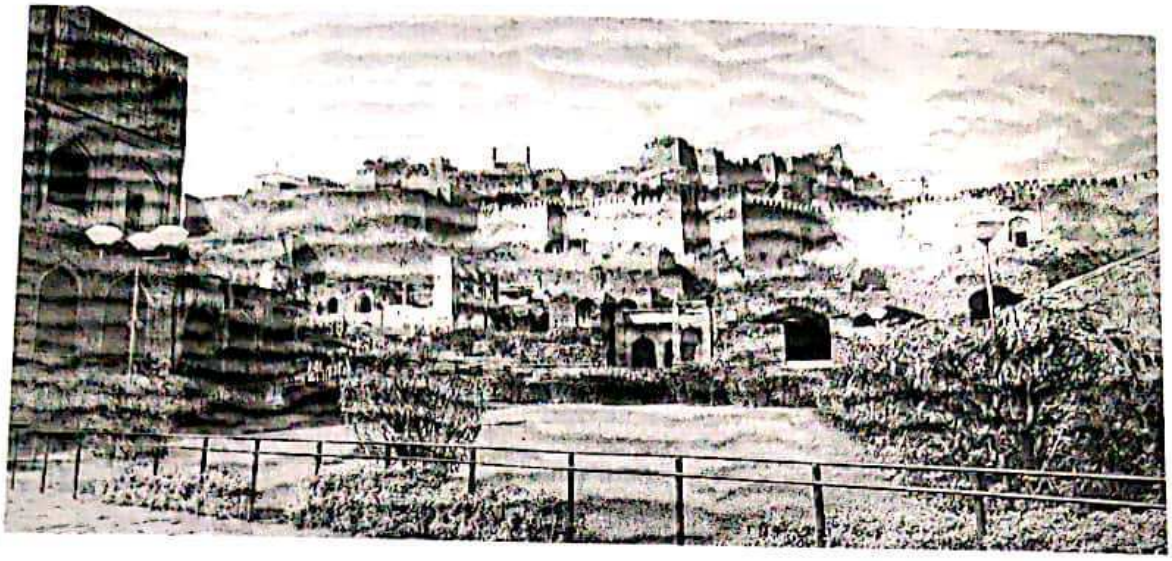

REALATED TO BPDD WHAT WE CAN SEE IN GOLCONDA FORT

- Acoustic Structures.
- Architectural planning of building.

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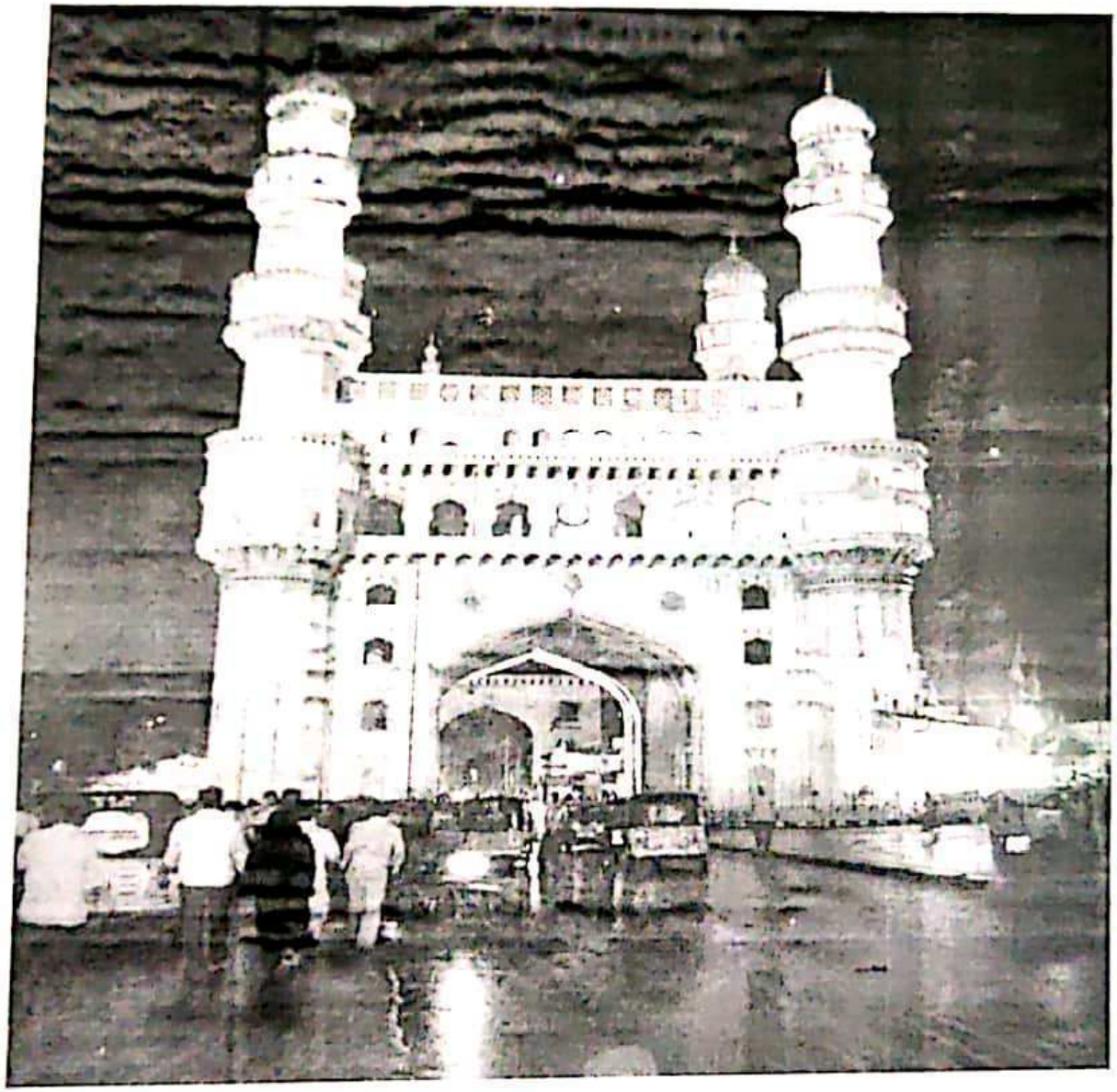
Charminar

The Charminar, constructed in 1591, is a monument and mosque located in Hyderabad, Telangana, India. The landmark has become known globally as a symbol of Hyderabad and is listed among the most recognized structures in India.



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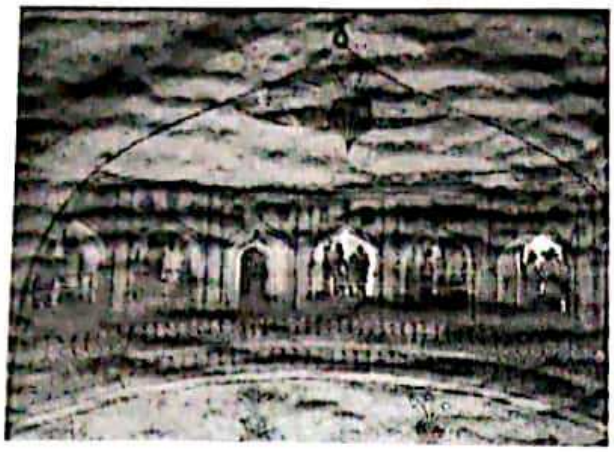

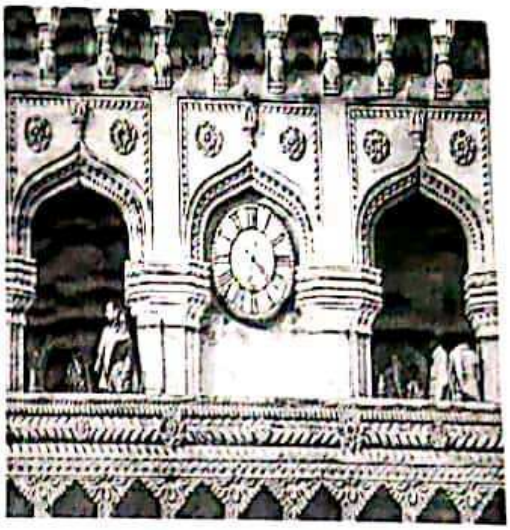

The Charminar's long history includes the existence of a mosque on its top floor for more than 400 years. While both historically and religiously significant, it is also known for the popular and busy local markets surrounding the structure, and has become one of the most frequented tourist attractions in Hyderabad.The Charminar was constructed at the intersection of the historical trade route that connects the markets of Golkonda with the port city of Machilipatnam. The Old City of Hyderabad was designed with Charminar as its centerpiece. The city was spread around the Charminar in four different quadrants and chambers, segregated according to the established settlements. Towards the north of Charminar is the Char Kaman or four gateways, constructed in the cardinal direction. The structure is made of granite, limestone, mortar, and pulverized marble, weighing approximately 14,000 tones apiece. Initially the monument was so proportionately planned that when the fort first opened, one could see all four corners of the bustling city of Hyderabad through each of its four grand arches, as each arch faced one of the most active royal ancestral streets.

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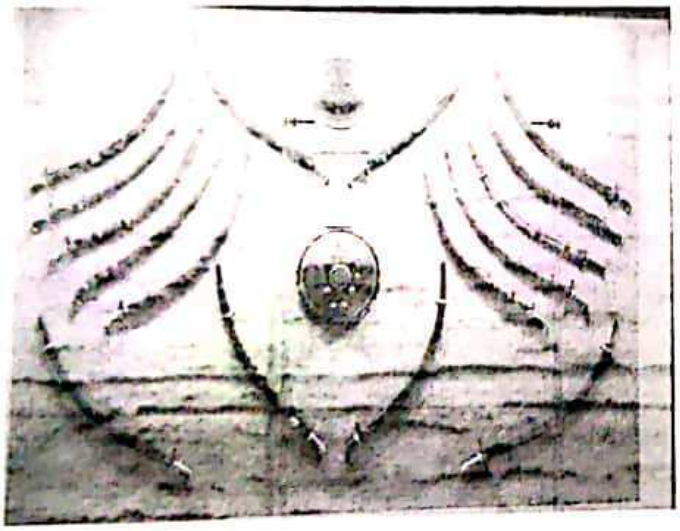
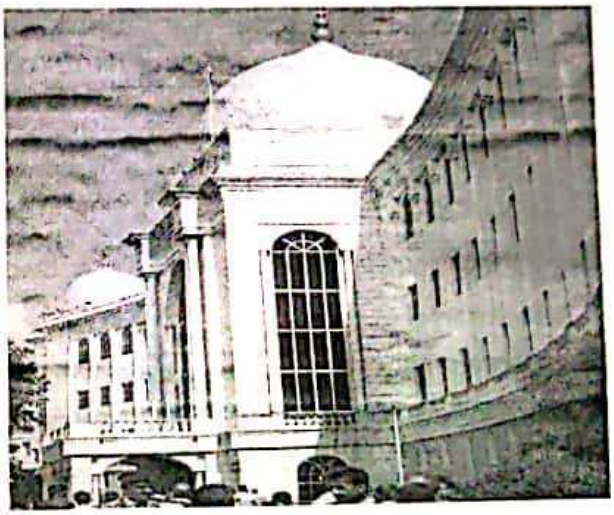
Salar Jung Museum

The Salar Jung Museum is an art museum located at Dar-ul-Shifa, on the southern bank of the Musi River in the city of Hyderabad, Telangana, India. It is one of the three National Museums of India. This museum is the also the third largest museum in India and it houses a collection of ancient manuscripts, ceramics, metallic artifacts, carpets, sculptures, textiles, paintings and clocks. Most of the articles treasured in this museum, belong to different civilizations. Daggers belonging to Empress Noor Jahan, Emperor Jehangir and Emperor Shah Jahan are among the important historical antiques found in the museum. The ancient artifacts held in the museum belong to the Salar Jung family and these collections dates back to the 1st century. Under the Salar Jung Museum Act of 1961, the museum is maintained by the Board of Trustees with the Governor of Andhra Pradesh as ex-officio chairperson. Apart from the thirty eight galleries containing precious artifacts, the museum also has a library, cafeteria, sales counter and a reading room. The Salar Jung Museum is one of the best tourist attractions in Hyderabad and it attracts about ten lakh visitors every year.





Salar Jung Museum contains thirty eight galleries, which are spread on two floors. There are twenty galleries on the ground floor and eighteen galleries on the first floor. Each gallery in the museum exhibits artifacts that are under separate subjects. The museum also has an education section, a laboratory for chemical conservation, a reading room, library, cafeteria and a salescounter. Salar Jung Museum is one of the most highly visited places in Hyderabad. This museum houses many historical articles collected by Nawab Mir Yousuf Ali Khan Salar Jung III during his lifetime. Some of the oldest artifacts treasured in the museum dates back to the 1st century, and one can find many antiques that belong to Middle East, Europe and Asia as well. Visit this museum with your friends and family and admire a world of ancient civilization.

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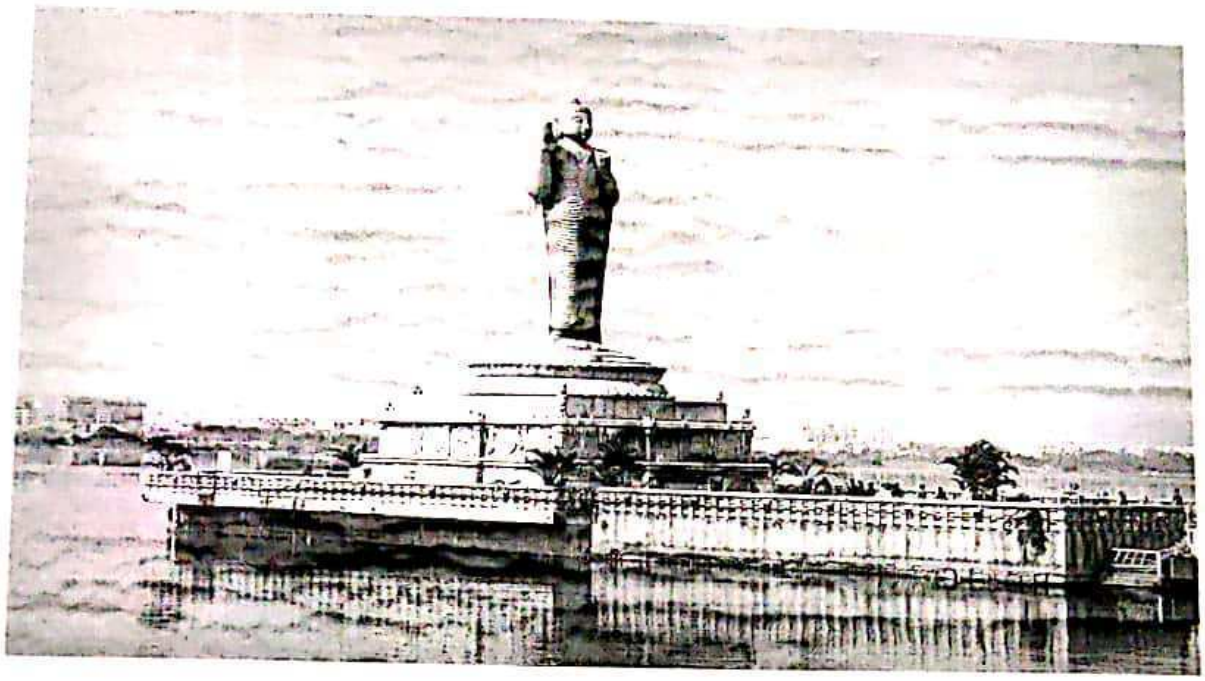
Hussain Sagar



Hussain Sagar is a heart-shaped lake in Hyderabad, Telangana, built by Ibrahim Quli Qutb Shah in 1563. It is spread across an area of 5.7 square kilometers and is fed by the River Musi. A large monolithic statue of the Gautama Buddha, erected in 1992, stands on Gibraltar Rock in the middle of the lake. It also separates the city centre of Hyderabad from its neighborhood Secunderabad.The maximum depth of the lake is 32 feet. Hussain Sagar was built across a tributary of the river Musi river in 1563 by Ibrahim Quli Qutb Shah. The lake was named after Hussain Shah Wali, who helped to design it. It is an artificial lake that holds water perennially fed by canals from Musi river. Hussain Sagar was the main source of water supply to Hyderabad before Himayat Sagar and Osman Sagar were built on river Musi.

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Birla Mandir



Birla Mandir is a Hindu temple, built on a 280 feet (85 m) high hillock called *Naubath Pahad* on a 13 acres (53,000 m^2) plot. The construction took 10 years and was opened in 1976 by Swami Ranganathananda of Ramakrishna Mission. The temple was constructed by Birla Foundation, which has also constructed several similar temples across India, all of which are known as Birla Mandir.

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Birla Science Museum

B. M. Birla Science Museum is an Indian science museum located in Hyderabad, India. Constructed by civil engineer P. A. Singaravelu, it comprises a planetarium, museum, science centre, art gallery as well as a dinosaurium. The museum itself was the second phase of the science centre when it opened in 1990.





REALATED TO DOSS WHAT WE CAN SEE IN:-

Birla Science Museum

- Architectural planning of building.

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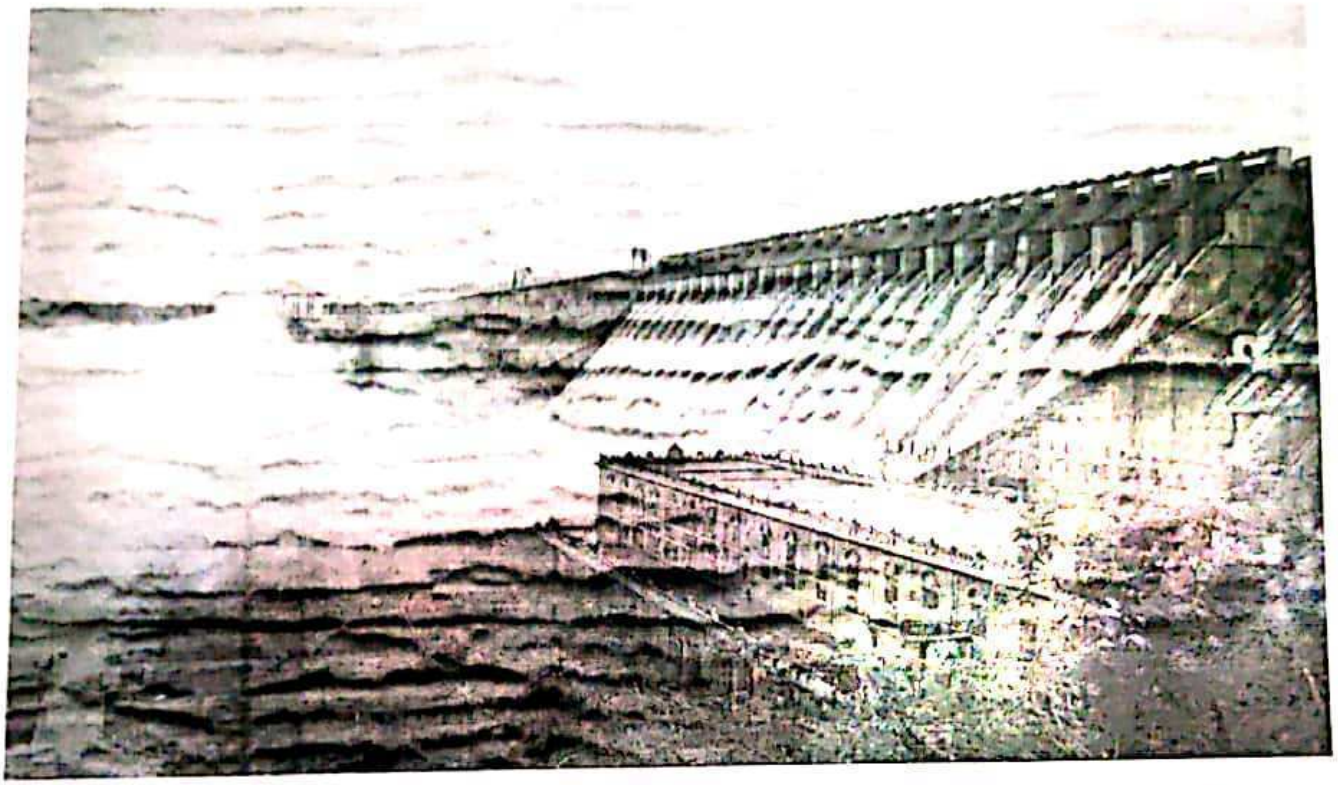
Nagarjuna Sagar Dam

Nagarjuna Sagar Dam is a masonry dam across the Krishna river at Nagarjuna Sagar which straddles the border between Guntur district, Andhra Pradesh and Nalgonda district, Telangana. Constructed between 1955 and 1967, the dam created a water reservoir with gross storage capacity of 11.472 billion cubic metres.



Nagarjuna Sagar was the earliest in a series of large infrastructure projects termed as "modern temples" initiated for achieving the Green Revolution in India. It is also one of the earliest multi-purpose irrigation and hydro-electric projects in India.The dam provides irrigation water to the Nalgonda, Suryapet, Krishna, Khammam, West Godavari, Guntur and Prakasam districts along with hydro electricity generation. Nagarjuna Sagar dam is designed and constructed to use all the water impounded in its reservoir of 312 TMC gross storage capacity which is the second biggest water reservoir in India.

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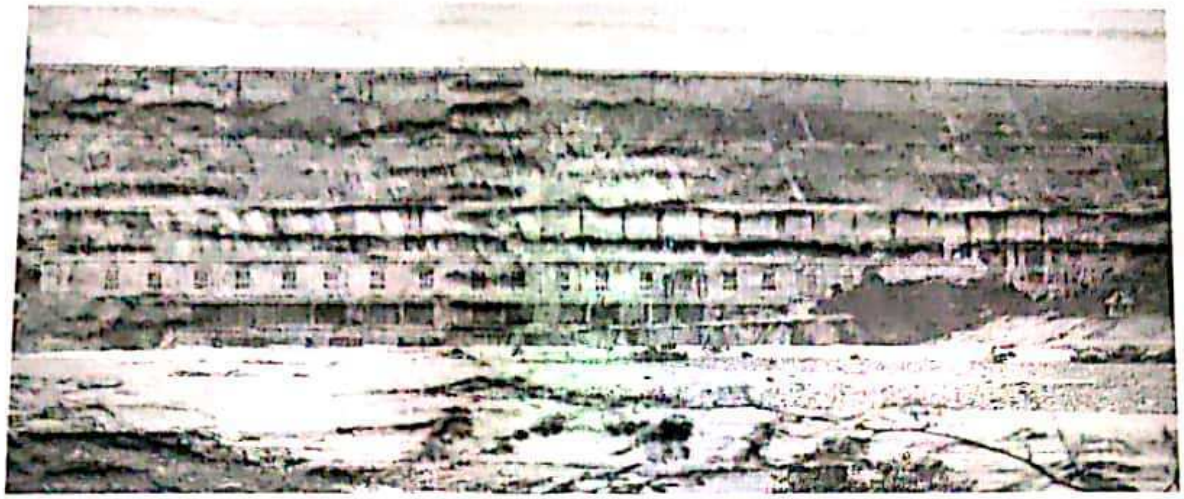
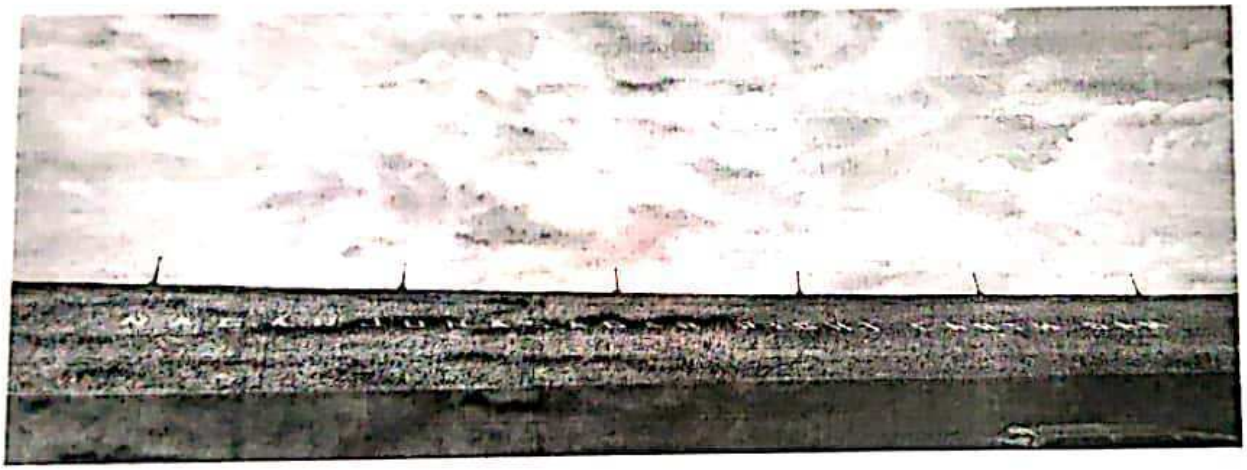


The hydroelectric plant has a power generation capacity of 815.6 MW with 8 units (1x110 MW+7x100.8 MW). First unit was commissioned on 7 March 1978 and 8th unit on 24 December 1985. The right canal plant has a power generation capacity of 90 megawatts (120,000 hp) with 3 units of 30 megawatts (40,000 hp) each. The left canal plant has a power generation capacity of 60 megawatts (80,000 hp) with 2 units of 30 MW each.The tail pond is under advanced stage of construction to put to use the pumped storage features of 7 x 100.8 MW units.



The right canal (Jawahar canal) is 203 km (126 mi) long with maximum 311.5 cumecs capacity and irrigates 1.117 million acres (4,520 km^2) of land in Guntur and Prakasam districts. The left canal (Lalbahadur Shastri canal) is 179 km (111 mi) long with maximum 311.5 cumecs capacity and irrigates 1.008 million acres (4,080 km^2) of land in Nalgonda, Suryapet, Krishna, West Godavari and Khamman districts.The project transformed the economy of above districts. 54 villages (48 in Nalgonda and 6 in Guntur) were submersed in water and 24,000 people were affected. The relocation of the people was completed by 2007.

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SVERI's
College of Engineering, Pandharpur

Civil Engineering Department

Industrial Visit

Class: SY-(Civil) Div-A & B

A.Y.: 2019-2020

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
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Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/CIVIL/2019-20/328 Date:- 06/02/2020

To,
Chief Engineer,
Nagarjuna Sagar Dam Circle,
Hill Colony, Nalconda
Hyderabad

Subject: Permission to Visit Nagarjuna Sagar Dam, Nalconda

Respectedsir,

As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, students of SE civil class are interested to visit Nagarjuna Sagar Dam, Nalconda to study components of Dam, Hydro Power Project.

So I kindly request you to permit us for this technical visit and spare one technical person to give information.
Your help in this regard is highly appreciated.

Thanking you in anticipation.

Date of visit:- 11/02/2020

SE student:-100

No of faculty members:-06

Waiting foryour reply.

Thanking You,

Yours faithfully,

Dr. P M Pawar
(HOD Civil & Dean Academics)

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Academic Year 2019-20 S.Y. B.Tech- Div. A Sem - II

Date: 17/12/2019

Roll No.	NAME OF STUDENT	Sign.	Roll No.	NAME OF STUDENT	Sign.
SA-1	BHOSALE VAISHNAVI SIDDHESHWAR		SA-36	MHETRE POONAM BHARAT	
SA-2	KALE PRAJAKTA SHARAD		SA-37	SURWASE SHRADDHA ANNARAO	
SA-3	LENDAVE TEJASHRI BHARAT		SA-38	DEVMARE NANDITA BASWESHWAR	
SA-4	MANE NISHA VIKAS		SA-39	SUHAIB TANTRY	
SA-5	NAGTILAK MONALI ARJUN		SA-40	KAVADE AARAVI RAJESH	
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SA-10	MANGRULE KAVYANJALI CHANDRAKANT		SA-45	PATIL HARSHAD DEVIDAS	
SA-11	JADHAV PRANITA JOTIRAM		SA-46	SAWANT AJAY DNYANDEO	
SA-12	BHONG BHAGYSHRI RAMESHWAR		SA-47	TANK GAURAV PRAVIN	
SA-13	SWAMI POOJA SHRISHAIL		SA-48	KUSUMADE HARSHAL UTTAM	
SA-14	YADAV MEGHA AUDUMBAR		SA-49	MISAL MANDAR JIVAJI	
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SA-16	CHAVAN AKANKSHA AVINASH		SA-51	BAGAL GANESH BALASAHEB	
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SA-20	MANE PRANALI SANJAY		SA-55	KAKADE SWAPNIL SUDHIR	
SA-21	MULANI NAZNEEN KAYYUM		SA-56	ANDESO PUL	
SA-22	RAUT SNEHAL SANJAY		SA-57	SHINDE SATYAM MAHADEV	
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SA-27	TAKMOGE MAYURI JAGANNATH		SA-62	JADHAV HARSHVARDHAN NITIN	
SA-28	BAGWAN ESHA SALIM		SA-63	INAMDAR REHAN IRFAN	
SA-29	BORADE SNEHAL SHIVAJI		SA-64	KHADE SUSHIL MADHAV	
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SA-33	TAMBOLI SIMRAN BAKAS		SA-68	DHEKALE PRASAD RAJARAM	
SA-34	JADHAV PRERANA TUKARAM		SA-69	GHOLAVE DEEPAK PRAMOD	
SA-35	DESHMUKH DIVYA BHALCHANDRA				

(Prof. / S. P. Patil)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

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COLLEGE OF ENGINEERING, PANDHARPUR.
Department of Civil Engineering

Industrial Visit

Academic Year 2019-20 S.Y. B.Tech- Div. B Sem - II

Roll No.	NAME OF STUDENT	Sign.	Roll No.	NAME OF STUDENT	Sign.
SB-1	DUDHAL PRAPTI PRAVIN		SB-35	BURANGE ANIKET SUBHASH	
SB-2	BAHIRWADE SHITAL NAGESH		SB-36	DOKE PRATIK BAJIRAO	
SB-3	BIRAJDAR PRATIBHA VENKAT		SB-37	PATIL KAPIL VIJAY	
SB-4	DESAI BHAGYASHRI PANDURANG		SB-38	KOTALKAR ASHUTOSH SANTAJI	
SB-5	DHOLE SHIVANI RAJENDRA		SB-39	KADAM NIKHIL NAVNATH	
SB-6	JADHAV VAISHNAVI MANOJ		SB-40	GATKAL PRAJYOT RAMAKANT	
SB-7	KAMBLE ANJALI SHAHAJI		SB-41	MULLA AMEER SULEMAN	
SB-8	KSHIRSAGAR PRAGATI PANDURANG		SB-42	INGALE RUTVIK BHARAT	
SB-9	METKARI KSHITIJA NARAYAN		SB-43	RASALE NIRAJ RUSHIKESH	
SB-10	PATIL AISHWARYA PANDIT		SB-44	DONGARE SWAPNIL SHANKAR	
SB-11	PATIL SONALI TANAJI		SB-45	MASKE ONKAR SANJAY	
SB-12	PULA PRIYANKA GURUCHARAN		SB-46	DODTALLE NIKHIL SUNIL	
SB-13	PUKALE AISHWARYA SHYAM		SB-47	GAYALI OMKAR BHARAT	
SB-14	SAPKAL MAYURI DILIPKUMAR		SB-48	KAZI SAYYADNAVID MAHAMAD	
SB-15	SHAIKH NIKHAT LALSAB		SB-49	GIRI Kiren Panchanan	
SB-16	SHEKH SHAHEEN JAKIRHUSEN		SB-50	MALI PRASHANT VIJAY	
SB-17	SHIVSHARAN VRUSHALI SUNIL		SB-51	SATPUTE RUSHIKESH KISHOR	
SB-18	SONY KOTWAL		SB-52	SAKHARE SHREYASH SOMNATH	
SB-19	SURWASE PRATIKSHA DATTATRAY		SB-53	NAVALE AKASH APPASAHEB	
SB-20	SHINDE ASHA KISAN		SB-54	AOUSEKAR GAURAV GANESH	
SB-21	KHARAT SHRIKANT KALYAN		SB-55	BHAIKATTI SWAPNIL APPASHA	
SB-22	BHUMKAR MANOJ DNYANESHWAR		SB-56	DHAVARE UMESH MARYAPPA	
SB-23	HARWALKAR SAMARTH ANAND		SB-57	DHOTRE BHADRI SHRIKANT	
SB-24	DANDAGE HARSHVARDHAN SHIVAJI		SB-58	GAVALI SUJIT KESHAV	
SB-25	JAGADALE PRANAV VIVEKANAND		SB-59	GOSAVI SHRIYASH AMOL	
SB-26	MASAL VIVEK DATTATRAYA		SB-60	JADHAV SHAILESH DHARMRAJ	
SB-27	BHANGE SURAJ SIDDHESHWAR		SB-61	KAMBLE KATEPPA AMBANNA	
SB-28	ADMANE SAURABH VITTHAL		SB-62	LENDAVE MAYUR VASANT	
SB-29	NAMADE SOHAM DHANAJI		SB-63	PAWAR AMOL MARUTI	
SB-30	ALDAR SHANKAR ASHOK		SB-64	PATIL JITENDRA SANJEEV	
SB-31	BHOSALE SURAJ DEEPAK		SB-65	SALUNKHE MAHESH DATTATRAYA	
SB-32	DUDHANI SIDDHESHWAR PRASADBABU		SB-66	SHINDE AKSHAY JAGNNATH	
SB-33	RAUT DNYANESHWAR NAVANATH		SB-67	UTAGI SWAROOP MALLINATH	
SB-34	PAWAR SUMIT ARUN				

(Prof. C. R. Limkar)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: 7755990201 **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in **Website.**: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
Accreditated by The Indian Institution of Engineers (India), Kolkata and TCS, Pune.
NAAC Accreditated Institute, **NBA** Accredited All UG Programmes,
ISO 9001:2008 Certified Institute.

Date:- 06/02/2020

Office Order

Following faculty members has deputed for Industrial visit from 09/02/2020 to 12/02/2020. So you are requested to act accordingly.

Sr. No.	Class	Name of Faculty	Sign
01	S.E.	Prof. C.R.Limkar	
02		Prof. G. S. Pawar	
03		Prof. S. J. Shinde	
04		Prof. / S. P. Patil	
05		Prof. / P. D. Taralgatti	

Thanking you.

Yours faithfully,

(Dr. P.M.Pawar)
HOD CIVIL ENGG.

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Date: 06/02/2020

To,

The Principal/Dean Students,

SVERI's CoE Pandharpur.

Subject: Permission for Industrial Visit of SE Civil.

Respected Sir,

As per curriculum laid down by Punyashlok Ahilyadevi Holkar Solapur University, Solapur for SE Civil (Part II), the subject of Hydraulic Engineering, Building Planning Design and Drawing include visits. In the Processing of same we have sent letter related to Industrial spot. In view of this, we requested you to grant us the permission to arrange visit of SE Civil on 08/2/2020 to 11/2/2020.

Thanking You,

Prof.C R Limkar	Sabil	Dr.P.M.Pawar
Class-co-ordinator	Subject Teacher	HoD-Civil

S. D. Jagdale Director

Permitted for Ind. visit subject to following conditions:-
- Undertaking be collected for All students @ visit
- care be taken near dam site & other places
- All concern should attend college on 08/02/2020.

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SCHEDULE OF INDUSTRIAL VISIT

Day 0 (08/02/2020) 06.00 PM: Pandharpur- Hyderabad (410 KM)

Day 1 (9/2/2020): Birla Science Museum (3KM), Golconda Fort (10KM)

Day 2 (10/2/2020): Building site visit, Charminar and then Salar Jung Museum

Day 3 (11/2/2020): Nagarjuna Sagar Dam and then towards Pandharpur.

Prof. C.R. Limkar

S.P. Patil

Class-co-coordinator

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
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Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/CIVIL/2019-20/328 Date:-06/02/2020

To,
Chief Engineer,
Nagarjuna Sagar Dam Circle,
Hill Colony, Nalconda
Hyderabad

Subject: Permission to Visit Nagarjuna Sagar Dam, Nalconda

Respectedsir,

As per curriculum of Punyashlok Ahilyadevi Holkar Solapur University, students of SE civil class are interested to visit Nagarjuna Sagar Dam, Nalconda to study components of Dam, Hydro Power Project.

So I kindly request you to permit us for this technical visit and spare one technical person to give information.
Your help in this regard is highly appreciated.

Thanking you in anticipation.

Date of visit:- 11/02/2020

SE student:-100

No of faculty members:-06

Waiting foryour reply.

Thanking You,

Yours faithfully,

Dr. P M Pawar
(HOD Civil & Dean Academics)

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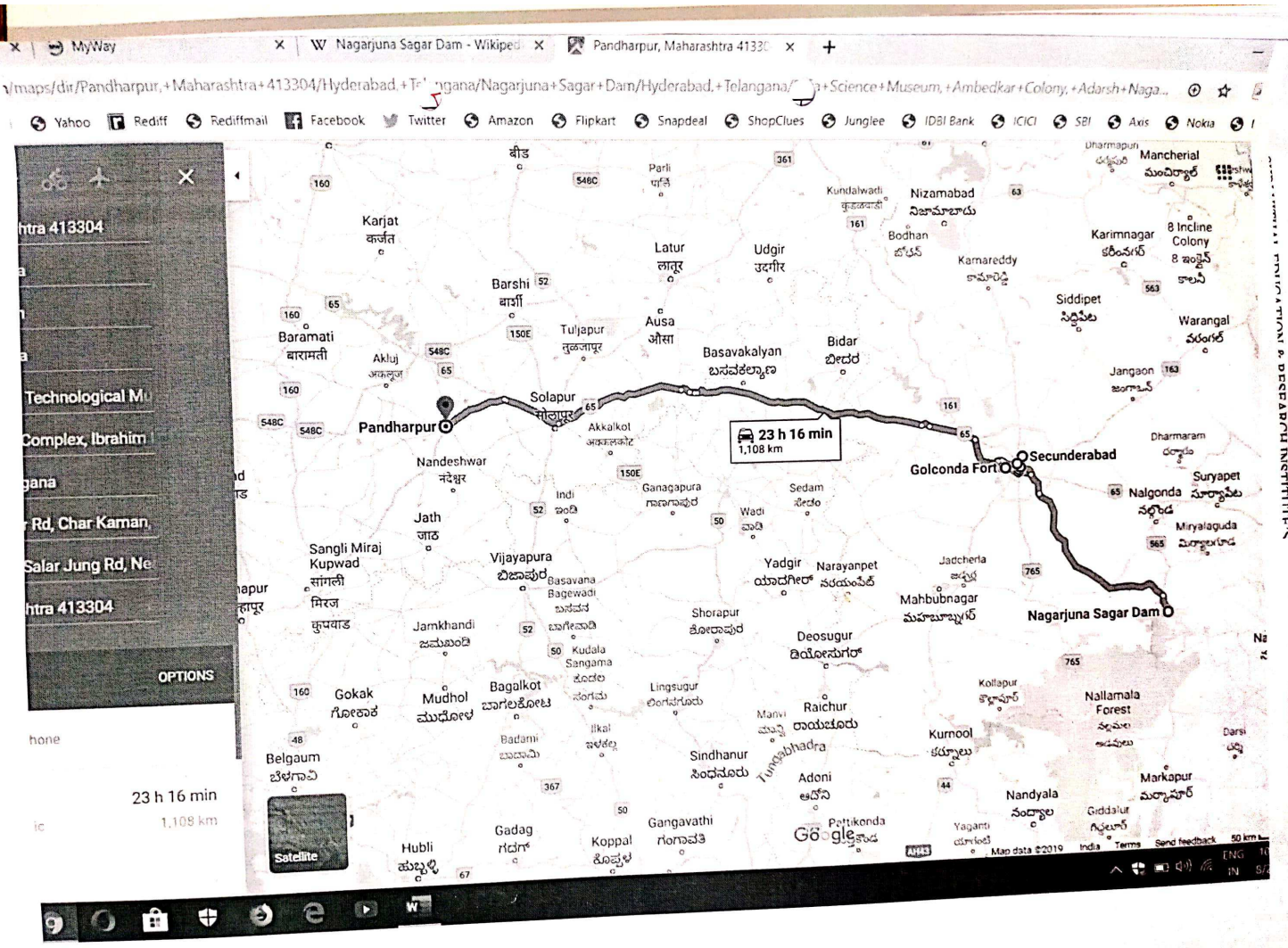

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Department of Civil Engineering

Academic Year 2019-20 S.Y. B.Tech- Div. A Sem - II

Date: 06/02/2020

Roll No.	NAME OF STUDENT	Sign.	Roll No.	NAME OF STUDENT	Sign.
SA-1	BHOSALE VAISHNAVI SIDDHESHWAR		SA-36	MHETRE POONAM BHARAT	
SA-2	KALE PRAJAKTA SHARAD		SA-37	SURWASE SHRADDHA ANNARAO	
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SA-14	YADAV MEGHA AUDUMBAR		SA-49	MISAL MANDAR JIVAJI	
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SA-34	JADHAV PRERANA TUKARAM		SA-69	GHOLAVE DEEPAK PRAMOD	
SA-35	DESHMUKH DIVYA BHALCHANDRA				

(Prof. S. P. Patil)
Class Coordinator

(Dr. P. M. Pawar)
HOD Civil Engg

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE S
COLLEGE OF ENGINEERING

PANDHARPURGopalpur- RanjaniRoad, Gopalpur, P.B. No.54 Tal – Pandharpur – 413304 Dist – Solapur (Maharashtra) Ph :02186 325782 Fax : 02186 225082
(Approved by AICTE, New Delhi and MSBTE Mumbai)

Industrial Visit

SE Civil (2019-20)

Route: - Pandharpur – Solapur-Hyderabad –Solapur-Pandharpur (Appx: 1100Km)

Place: - Departure from Pandharpur

Day	Place to visit	Subject
08/02/2020	Departure from Pandharpur towards Hyderabad At 05:30PM. Arrival at Hyderabad 8:00AM (410 Km) via Deglur.	
1st Day 09/02/2020 2hrs for fresh and breakfast	08:00am – 10:00am Hault to Birla Science Museum(3KM) 01:00PM Departure for lunch Departure towards GolcondaFort (10KM)	WRE-II (Hydraulic structures), DOSS, Architectural planning of buildings. Acoustic structures
# Hault and dinner	At 07:00PM departure towards Dinner from 08:00pm to 10:00pm Hault Hyderabad.	

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2nd Day 10/02/2020	09:00am Departure towards Building site visit Departure for lunch Departure towards Charminar and then Salar Jung Museum	BPDD
#Hault and Dinner	Hault Youth Hostel, Nagarjuna Sagar Dam	
3rd Day 11/02/2020	Departure towards Nagarjuna Sagar Dam At 05:00pm departure towards Hyderabad Dinner from 08:00PM to 10:00PM departure towards Pandharpur 6.00 AM arrival time.	1) Structure of dam and its component parts. 2)Electricity generation Hydroelectric Power Plant

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SVERI's
College of Engineering, Pandharpur

Department of Civil Engineering

Sample Project Report

A.Y.: 2019-2020

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR-413304
2019-2020.



Shri Vithal Education & Research Institute

"Experimental Analysis of ordinary concrete using destructive and non destructive testing."

A DISSERTATION
SUBMITTED TO PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
FOR THE DEGREE OF
BACHELOR OF ENGINEERING
IN
CIVIL ENGINEERING
UNDER THE FACULTY OF ENGINEERING AND TECHNOLOGY

PREPARED BY

1)Mr SHUBBHAM SUNIL KADAM,
2)Mr GANESH SHANKAR BABAR,
3)Mr VAIBHAV VASANT KALE ,
4)Mr GANESH MADAN SHINDE.

UNDER THE GUIDANCE
OF
PROF. AVINASH B. KOKARE

DECLARATION

We hereby declare that the dissertation entitled **"Experimental Analysis of ordinary concrete using destructive and non destructive testing."**Completed and written by us has not previously formed the basis for the award of any Degree or Diploma or other similar title of this or any other University or examining body.

Members:-

1) Mr. SHUBBHAM SUNIL KADAM,
2) Mr. GANESH SHANKAR BABAR,
3) Mr. VAIBHAV VASANT KALE ,
4) Mr. GANESH MADAN SHINDE.

Place: Pandharpur
Date:

Acknowledgement

While working on the current dissertation on "Experimental analysis for Compressive Strength of Concrete using Destructive and Non-Destructive Testing", we got exposed to a field of testing and inspection due to support of various teachers and friends.

First and foremost, we would like to take this opportunity to express our gratitude to our guide Prof.A.B.Kokare for providing all resources and great platform to accomplish our target. We are also thankful to him for constant valuable guidance and encouragement during this course period. He always appreciated whatever little progress we have achieved, and continuously gave us new energy by sharing his precious knowledge and experience. Apart from technical skills, He has also introduced professional skills and confidence in us.

We would like to acknowledge our Head of Department Dr.P.M.Pawar and Principal Dr.B.P.Ronge for spending his valuable time to go through our report and providing many helpful suggestions. We would also like to acknowledge Department of Civil Engineering who provide us the facilities for completion of this project.

Specially, we would like to express our deep, incomplete appreciation and gratitude to our family members for their constant spiritual support and encouragement and to pursue the higher technical education.

Group Members:-

1) Mr. SHUBBHAM SUNIL KADAM,

2) Mr. GANESH SHANKAR BABAR,

3) Mr. VAIBHAV VASANT KALE ,

4) Mr. GANESH MADAN SHINDE.

ABSTRACT

Assessment of in-situ concrete, a major building material in construction has been of considerable interest in Construction Industry, mainly for quality control as well as to find in-situ strength. The measurement of strength and other performance parameters is generally done by normal destructive tests. However load tests or core tests are not always possible or practicable. Since last decade, non-destructive testing (NDT) has been widely accepted throughout the world to assess the quality of in-situ concrete. The NDT technique includes Rebound hammer, Ultrasonic Pulse Velocity tests, Penetration tests, radiography tests etc. However none of these tests can be used independently to yield reliable quantitative results.

Generally combination of a few Non-destructive tests yields results of acceptable levels. A number of Correlations between Rebound hammer test and Ultrasonic pulse velocity test results have been developed to obtain reliable results. Recently a combination of NDT techniques like Rebound hammer, Ultrasonic pulse velocity has been used to evaluate the quality of few distressed structures in India, successfully to recommend their restoration. Supplementary CTM test results confirmed the reliability of the correlation between the different NDT techniques used.

This thesis describes a study carried out to investigate the effects of some factors that have significant influence on Rebound Hammer and Ultrasonic Pulse Velocity results. Therefore, test cubes were cast and tested for ordinary grades of concrete for different curing conditions and age of testing in order to obtain correlations of concrete strength with Rebound Hammer and Ultrasonic Pulse Velocity test results. Further, adopting the test results a comparison is made between destructive and non-destructive testing to predict concrete strength with a reasonable accuracy.

Also we have replaced 30% of fly ash and 2% fibers are added to the concrete and same procedure is repeated and results are compared with curing and without curing.

The results are also compared as destructive and non destructive test.

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Chapter1
Introduction

The main objective of this project is to identify the strength of ordinary concrete and concrete using admixture such as combination of fly ash and synthetic fibers. For this study available data is clustered. The compressive strength results obtained from Destructive and Non Destructive Testing methods are compared.

General Information

It is often necessary to test concrete structures after the concrete has hardened to determine whether the structure is suitable for its designed use. Ideally, such testing should be done without damaging the concrete. The test available for testing concrete range from completely non-destructive tests, where there is no damage to the concrete, through those where the concrete surface is slightly damaged to partially destructive tests, such as core tests and pull-out and pull-off tests, where the surface has to be repaired after the test.

What is mean by NDT?

Nondestructive testing (NDT) is the process of inspecting, testing, or evaluating materials, components or assemblies for discontinuities, or differences in characteristics without destroying the serviceability of the part or system. In other words, when the inspection or test is completed the part can still be used. Non-Destructive Testing (NDT) is a wide group of analysis techniques used in science and technology industry to evaluate the properties of a material, component or system without causing damage. The term nondestructive inspection (NDI), and nondestructive evaluation (NDE) are also commonly used to describe this technology. Because NDT does not permanently alter the article being inspected, it is a highly valuable technique that can save both money and time in product evaluation, troubleshooting, and research. NDT plays a crucial role in everyday life and is necessary to assure safety and reliability. Typical examples are found in aircraft, spacecraft (shuttle), motor vehicles, pipelines, bridges, trains, power stations, refineries, buildings and oil platforms which are all inspected using NDT.

NDT is a Quality Assurance management tool which can give impressive results when used correctly. It requires an understanding of the various methods available, their capabilities and limitations, knowledge of the relevant standards and specifications for performing the tests. Materials, products and equipment which fail to achieve their design requirements or projected life due to undetected defects may require expensive repair or early replacement. Such defects may also be the cause of unsafe conditions or catastrophic failure, as well as loss of revenue due to unplanned plant shutdown. Non-destructive testing can be applied to each stage of an item's construction. The materials and welds can be examined using NDT and either accepted, rejected or repaired.

NDT techniques can then be used to monitor the integrity of the item or structure throughout its design life. Today modern nondestructive tests are used in manufacturing, fabrication and in-service inspections to ensure product integrity and reliability, to control manufacturing processes, lower production costs and to maintain a uniform quality level. During construction, NDT is used to ensure the quality of materials and joining processes during the fabrication and erection phases, and in-service NDT inspections are used to ensure that the products in use continue to have the integrity necessary to ensure their usefulness and the safety of the public.

Applications and Importance of Non-destructive Tests on Concrete

- Situations in which non-destructive testing is used are presented below:
- Assessment of the quality of construction like in situ constructions and precast units.
- Evaluate the location and the extent of defects such as honeycombing, cracks, voids, and other defects within concrete elements.
- Ensure the acceptability of materials supplied in case of apparent non-compliance with the specification.
- Monitoring strength development of concrete in relation to formwork removal, cessation of curing, prestressing, load application, and other similar activities.

- Confirm or negate any doubts concerning the workmanship involved in batching, mixing, placing, compacting, or curing of concrete.
- Specify the position and condition of steel reinforcements.
- Increase the level of confidence of smaller number of destructive tests.
- Evaluate the potential durability of concrete.
- Locating and/or confirming suspected concrete deterioration due to overloading, fire, explosion, fatigue, external or internal chemical attack or change, and environmental effects.
- Monitor long term changes in concrete properties.
- Determine the extent of concrete variability so as to help in the selection of sample locations representative of the quality to be assessed.
- Obtain information for any suggested changes of use of a structure for insurance or for change of ownership.
- Specify the concrete uniformity, possibly preliminary to core cutting, load testing, and other more expensive or disruptive tests

Advantages of NDT

1. Safety

Nondestructive testing is conducted to determine whether the component is compromised and need to be in repair. The tests are designed to maximize both tester and tested products safety. In other words, most tests are completely harmless to humans (radiographic testing must be conducted under strict settings), and all tests leave tested products completely undamaged. Additionally, in industries with volatile or high pressure equipment and machinery, nondestructive testing as a preventive measure saves lives. Aim of nondestructive testing, when properly implemented and acted upon, is to identify and resolves compromises that otherwise would prove disastrous.

2. Reliability

When it comes to accurate results, Nondestructive testing is reliable because of the variety of available complementary options. Any given piece of equipment or machinery can be subjected to number of nondestructive tests, which eliminates the risk of oversight or inaccuracy.

3. Affordability

Different industries have different safety standards, and different types of machinery have to be regularly inspected at different intervals. But regardless of what has to be inspected, a nondestructive test will always be the most affordable option.

4. Peace of mind

The final benefit of nondestructive testing may be hard to quantify, but it's the most important of all. Knowing the equipment is functioning the way it should (and that future accidents can be prevented with simple checkups) adds years to the life of a beleaguered manager. And when workers know they're safe, work productivity goes up all around.

Methods of NDT

1. Rebound Hammer Test

To assess the quality and strength of site concrete

2. Ultrasonic Pulse Velocity Test :

To assess the quality and strength of site concrete

3. Concrete Core Extraction :

To assess the In-situ strength of concrete, Making holes in RCC for Plumbing / Electrical purpose

4. Rebar Location & Cover-meter :

Locating Reinforcement in the concrete

5. Half-cell potential Test & Resistivity Test :

For Corrosion Mapping of reinforcement

6. Magnetic particle testing:

7. Visual Testing:

8. Eddy Current Testing

What is mean by Destructive test?

In contrast to NDT, other tests are destructive in nature and are therefore done on a limited number of samples ("lot sampling"), rather than on the materials, components or assemblies actually being put into service. These destructive tests are often used to determine the physical properties of materials such as impact resistance, ductility, yield and ultimate tensile strength, fracture toughness and fatigue strength, but discontinuities and differences in material characteristics are more effectively found by NDT.

In destructive testing (or destructive physical analysis, DPA) tests are carried out to the specimen's failure, in order to understand a specimen's performance or material behavior under different loads. These tests are generally much easier to carry out, yield more information, and are easier to interpret than non-destructive testing. Destructive testing is most suitable, and economic, for objects which will be mass-produced, as the cost of destroying a small number of specimens is negligible. It is usually not economical to do destructive testing where only one or very few items are to be produced (for example, in the case of a building). Analyzing and documenting the destructive failure mode is often accomplished using a high-speed camera recording continuously (movie-loop) until the failure is detected. Detecting the failure can be accomplished using a sound detector or stress gauge which produces a signal to trigger the high-speed camera. These high-speed cameras have advanced recording modes to capture almost any type of destructive failure. After the failure the highspeed camera will stop recording. The capture images can be played back in slow motion showing precisely what happen before, during and after the destructive event, image by image.

Objectives

1. To assess the uniformity of concrete.

2. To know the concrete quality grading.

3. To determine the compressive strength of concrete by destructive testing method.

4. To compare the compressive strengths of concrete obtained from Destructive and Non-Destructive testing.

Methodology

1. To assess the uniformity of concrete

To achieve this objective we have casted six numbers of cubes for curing period of 7 days, 28 days and without curing tested for compressive strength using rebound hammer test.

2. To know the concrete quality grading.

To achieve this objective we have casted six numbers of cubes for curing period of 7 days, 28 days and without curing tested for pulse velocity by Ultrasonic pulse velocity test and compressive strength is calculated.

3. To determine the compressive strength of concrete by destructive testing method.

To achieve this objective we have casted six numbers of cubes for curing period of 7 days, 28 days and without curing tested under compressive testing machine and compressive strengths of concrete are calculated.

4. To compare the compressive strengths of concrete obtained from Destructive and Non-Destructive testing.

To achieve this objective we have compared results obtained of compressive strengths by using rebound hammer test, Ultrasonic pulse velocity test and compressive testing machine.

Chapter 2
Literature Review

Nondestructive techniques are useful evaluating the condition of structure, by performing indirect assessment of concrete properties. These techniques have been improved in last few years and the best part is that NDT avoids concrete damage for evaluation. Several researchers perform NDT tests to evaluate the condition of concrete structures. Methods range from very simple to technical depending on the purpose. Several mechanical and physical properties of concrete structures can be used to assess the condition and capacity of the structures.

1. Non-Destructive Testing of Concrete: A Review of Methods

J. Helal, M. Sofi, P. Mendis, et. al. [1] This paper reviews the most common non-destructive testing (NDT) methods of concrete structures as utilized by the structural engineering industry. The fundamentals of NDT methods are explored in regards to their potential, limitations, inspection techniques and interpretations. The factors that influence the success of NDT methods are discussed and ways to mediate their influence are recommended. Reference is made to standard guidelines for the application and interpretation of the discussed NDT methods. NDT of concrete was found to be gaining increasing acceptance as a means of evaluating the strength, uniformity, durability and other properties of existing concrete structures. Perceptions of NDT inadequacy were attributable to lack of understanding construction materials and NDT methods themselves. The intent of this paper is to address these concerns by identifying and describing the most common successful methods of NDT as applied to concrete structures.

2. Reliability of Rebound Hammer Test in Concrete Compressive Strength Estimation

Kristine Sanchez, and Nathaniel Tarranza et. al.[2]The reliability of the non-destructive Schmidt Hammer Test as a means of estimating the compressive strength of concrete is investigated by testing three groups of concrete cube specimens. The first group was exposed to cycles of alternate drying and wetting in brackish water; the second group, to continuous immersion in brackish water;

and the third (control) group, to normal room condition. Results show that the average Schmidt Hammer Rebound Number (RN) for samples in the first and second group is significantly less than that of the third group. These indicate the reliability of the Schmidt Hammer Test in predicting the reducing effect of exposure to brackish water on the compressive strength of concrete. Moreover, results show that in each of the three groups, the average estimated compressive strength of concrete based on Schmidt Hammer Test (using the rebound curve provided by the manufacturer of the device) underestimates the average actual compressive strengths based on direct compression test. Thus, in a quick strength and safety assessment of existing concrete structures, the Schmidt Hammer Test is fairly reliable in determining whether the further use of the structure would still be safe, but may not be so in concluding whether the use is no longer safe. In the latter case, the Schmidt Hammer Test should be supplemented by core sampling and testing.

3. Review of Nondestructive Testing Methods for Condition Monitoring of Concrete Structures.

Sanjeev Kumar Verma and Saleem Akhtar et. al.[3]Nondestructive techniques are useful for evaluating the condition of structure, by performing indirect assessment of concrete properties. These techniques have been improved in last few years and the best part is that NDT avoids concrete damage for evaluation. Several researchers perform NDT tests to evaluate the condition of concrete structures. Methods range from very simple to technical depending on the purpose.

4. Toughness study on fly ash based fiber reinforced concrete

A Sofi,K Swathy and G Srija et. al.[4] The objective of the present investigation is to study the toughness of steel fiber-reinforced fly ash concrete based on the Japan Society of Civil Engineers (JSCE) approach. Fly ash is also considered as a hazardous waste due to the probable aching of potentially toxic substances into the surface water, ground water, and soil. The ash content of the Indian coal (30% to 50%) contributes to these large volumes of fly ash. This paper highlights about the behavior of concrete when fly ash and steel fiber are added in concrete. Fiber-reinforced concrete is a concrete containing fibrous material which increases its structural integrity. The addition of random fibers to concrete considerably improves its structural characteristics

such as static flexural strength, impact strength, tensile strength, ductility, and flexural toughness (Qian and Stroeven, Cem. Concr. Res. 30:63–68, 2000). Fly ash has been used by replacing cement in percentages, and steel fibers are added by volume of concrete in different percentages. Grooved type of steel fibers of aspect ratio 50 was used in this study. Flexural strength test was carried out for the specimens, and its results were highlighted. The toughness factor as measured by the JSCE approach is reported, and there is a good correlation between the steel fibers added in various percentages such as 1.5%, 2%, and 2.5% and the calculated toughness factor.

5. Ultrasonic Pulse Velocity Analysis in Concrete Specimens

Alexandre Lorenzi, Francisco Teston Tisbierek et. al.[5] Concrete is a basic material used for the great amount of engineering projects. The concrete performance is influenced by some building variables, such as: the water/cement ratio, the aggregate type and size, the humidity and the cement type. These variables affect directly the compressive strength and make difficult the identification of the concrete properties. Focusing on it, the ultrasonic tests allow to estimate a correlation between the variables and the compressive strength. Once concrete is a heterogeneous material, the interpretation of the relation between the strength and the Ultrasonic Pulse Velocity (UPV) becomes complex. Aiming to understand how some parameters influence the UPV, this work studied different concrete types, with different characteristics, manufactured with portland cement and various types of aggregates. The data had been analyzed aiming to establish models to understand how the results of UPV are affected by variations at concrete conditions. The results show that it is possible to understand how the test condition variations affect the UPV outputs. This study indicates that UPV gives an important result of decisionmake about the conditions of concrete structures. It can be concluded that, by means of UPV, it is possible to contribute with the deterioration control and concrete structures quality.

Chapter 3
Methods of Destructive and Non-destructive Testing

Equipments for Non-Destructive Testing of Concrete

1. Rebound Hammer

What is Rebound Hammer Test?

Rebound Hammer test is a Non-destructive testing method of concrete which provide a convenient and rapid indication of the compressive strength of the concrete. The rebound hammer is also called as Schmidt hammer that consist of a spring controlled mass that slides on a plunger within a tubular housing,

The operation of rebound hammer is shown in the fig.1. When the plunger of rebound hammer is pressed against the surface of concrete, a spring controlled mass with a constant energy is made to hit concrete surface to rebound back. The extent of rebound, which is a measure of surface hardness, is measured on a graduated scale. This measured value is designated as Rebound Number (rebound index). A concrete with low strength and low stiffness will absorb more energy to yield in a lower rebound value.

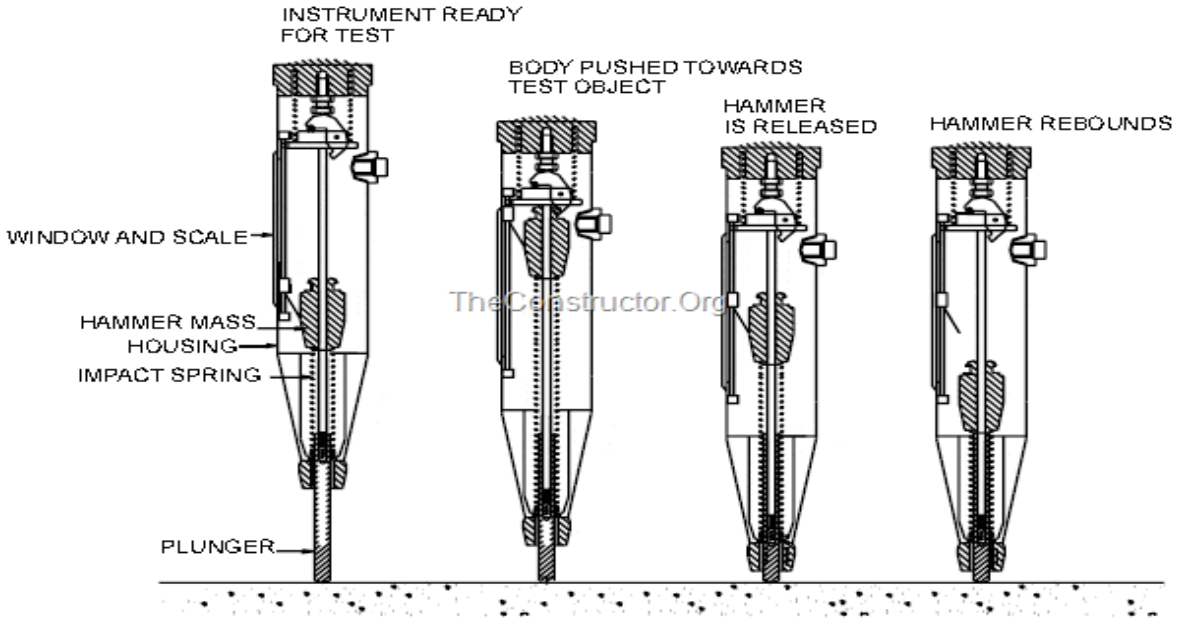


Fig. Operation of the rebound hammer

Objective of Rebound Hammer Test

As per the Indian code IS: 13311(2)-1992, the rebound hammer test have the following objectives:

1. To determine the compressive strength of the concrete by relating the rebound index and the compressive strength
2. To assess the uniformity of the concrete
3. To assess the quality of the concrete based on the standard specifications
4. To relate one concrete element with other in terms of quality

Rebound hammer test method can be used to differentiate the acceptable and questionable parts of the structure or to compare two different structures based on strength.

Principle of Rebound Hammer Test

Rebound hammer test method is based on the principle that the rebound of an elastic mass depends on the hardness of the concrete surface against which the mass strikes. The operation of the rebound hammer is shown in figure-1. When the plunger of rebound hammer is pressed against the concrete surface, the spring controlled mass in the hammer rebounds. The amount of rebound of the mass depends on the hardness of concrete surface.

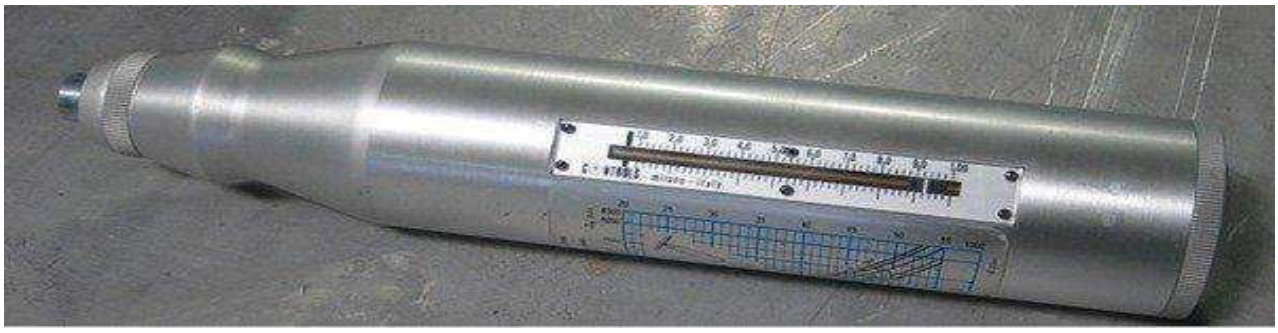
Thus, the hardness of concrete and rebound hammer reading can be correlated with compressive strength of concrete. The rebound value is read off along a graduated scale and is designated as the rebound number or rebound index. The compressive strength can be read directly from the graph provided on the body of the hammer.

Procedure for Rebound Hammer Test

Procedure for rebound hammer test on concrete structure starts with calibration of the rebound hammer. For this, the rebound hammer is tested against the test anvil made of steel having Brinell hardness number of about 5000 N/mm2.

After the rebound hammer is tested for accuracy on the test anvil, the rebound hammer is held at right angles to the surface of the concrete structure for taking the readings. The test thus can be conducted horizontally on vertical surface and vertically upwards or downwards on horizontal surfaces as shown in figure below.

If the rebound hammer is held at intermediate angle, the rebound number will be different for the same concrete.



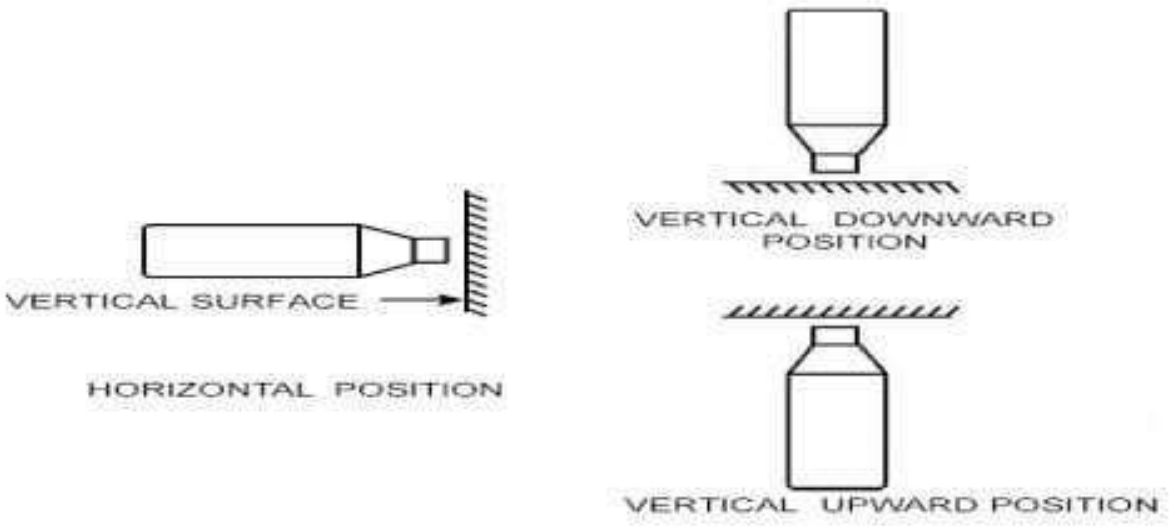


Fig. Rebound Hammer Positions for Testing Concrete Structure

The impact energy required for the rebound hammer is different for different applications. Approximate Impact energy levels are mentioned in the table-1 below for different applications.

Impact Energy for Rebound Hammers for Different Applications as per IS: 13311(2)-1992

Sr.No	Applications	Approximate Impact Energy for Rebound Hammer in Nm
1	For Normal Weight Concrete	2.25
2	For light weight concrete / For small and impact resistive concrete parts	0.75
3	For mass concrete testing Eg: In roads, hydraulic structures and pavements	30.00

Points to Remember in Rebound Hammer Test

1. The concrete surface should be smooth, clean and dry.
2. Ant loose particles should be rubbed off from the concrete surface with a grinding wheel or stone, before hammer testing.
3. Rebound hammer test should not be conducted on rough surfaces as a result of incomplete compaction, loss of grout, spelled or tooled concrete surface.
4. The point of impact of rebound hammer on concrete surface should be at least 20mm away from edge or shape discontinuity.
5. Six readings of rebound number is taken at each point of testing and an average of value of the readings is taken as rebound index for the corresponding point of observation on concrete surface.

Correlation between compressive strength of concrete and rebound number

The most suitable method of obtaining the correlation between compressive strength of concrete and rebound number is to test the concrete cubes using compression testing machine as well as using rebound hammer simultaneously. First the rebound number of concrete cube is taken and then the compressive strength is tested on compression testing machine. The fixed load required is of the order of 7 N/ mm2 when the impact energy of the hammer is about 2.2 Nm.

The load should be increased for calibrating rebound hammers of greater impact energy and decreased for calibrating rebound hammers of lesser impact energy. The test specimens should be as large a mass as possible in order to minimize the size effect on the test result of a full scale structure. 150mm cube specimens are preferred for calibrating rebound hammers of lower impact energy (2.2Nm), whereas for rebound hammers of higher impact energy, for example 30 Nm, the test cubes should not be smaller than 300mm.
The concrete cube specimens should be kept at room temperature for about 24 hours after taking it out from the curing pond, before testing it with the rebound hammer. To obtain a correlation between rebound numbers and strength of wet cured and wet tested cubes, it is necessary to establish a correlation between the strength of wet tested cubes and the strength of dry tested cubes on which rebound readings are taken.

A direct correlation between rebound numbers on wet cubes and the strength of wet cubes is not recommended. Only the vertical faces of the cubes as cast should be tested. At least nine readings should be taken on each of the two vertical faces accessible in the compression testing machine when using the rebound hammers. The points of impact on the specimen must not be nearer an edge than 20mm and should be not less than 20mm from each other. The same points must not be impacted more than once.

Interpretation of Rebound Hammer Test Results

After obtaining the correlation between compressive strength and rebound number, the strength of structure can be assessed. In general, the rebound number increases as the strength increases and is also affected by a number of parameters i.e. type of cement, type of aggregate, surface condition and moisture content of the concrete, curing and age of concrete, carbonation of concrete surface etc.

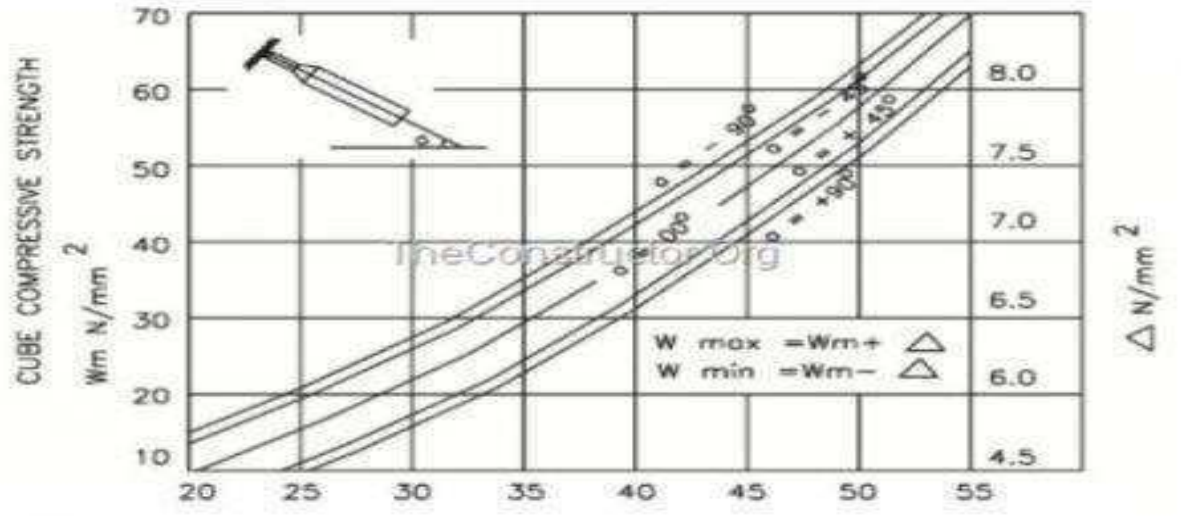


Fig. Relationship Between Cube Strength and the Rebound Number

Moreover the rebound index is indicative of compressive strength of concrete up to a limited depth from the surface. The internal cracks, flaws etc. or heterogeneity across the cross section will not be indicated by rebound numbers

Table. Quality of Concrete for different values of rebound number

Average Rebound Number	Quality of Concrete
>40	Very good hard layer
30 to 40	Good layer
20 to 30	Fair
< 20	Poor concrete
0	Delaminated

As such the estimation of strength of concrete by rebound hammer method cannot be held to be very accurate and probable accuracy of prediction of concrete strength in a structure is ± 25 percent. If the relationship between rebound index and compressive strength can be found by tests on core samples obtained from the structure or standard specimens made with the same concrete materials and mix proportion, then the accuracy of results and confidence thereon gets greatly increased.

Advantages and Disadvantages of Rebound Hammer Test

The advantages of Rebound hammer tests are:

1. Apparatus is easy to use
2. Determines uniformity properties of the surface
3. The equipment used is inexpensive
4. Used for the rehabilitation of old monuments

The disadvantages of Rebound Hammer Test

1. The results obtained is based on a local point
2. The test results are not directly related to the strength and the deformation property of the surface
3. The probe and spring arrangement will require regular cleaning and maintenance
4. Flaws cannot be detected with accuracy

2. Ultrasonic pulse velocity test

What is Ultrasonic Testing of Concrete for Compressive Strength?

Ultrasonic testing of concrete or ultrasonic pulse velocity test on concrete is a non-destructive test to assess the homogeneity and integrity of concrete.

With this ultrasonic test on concrete, following can be assessed:

1. Qualitative assessment of strength of concrete, its gradation in different locations of structural members and plotting the same.
2. Any discontinuity in cross section like cracks, cover concrete delimitation etc.
3. Depth of surface cracks.

Ultrasonic Testing of Concrete

Ultrasonic pulse velocity test consists of measuring travel time, T of ultrasonic pulse of 50 to 54 kHz, produced by an electro-acoustical transducer, held in contact with one surface of the concrete member under test and receiving the same by a similar transducer in contact with the surface at the other end.

With the path length L, (i.e. the distance between the two probes) and time of travel T, the pulse velocity (V=L/T) is calculated.

Higher the elastic modulus, density and integrity of the concrete, higher is the pulse velocity. The ultrasonic pulse velocity depends on the density and elastic properties of the material being tested.

The pulse velocity in concrete may be influenced by:

a. Path length
b. Lateral dimension of the specimen tested
c. Presence of reinforcement steel
d. Moisture content of the concrete

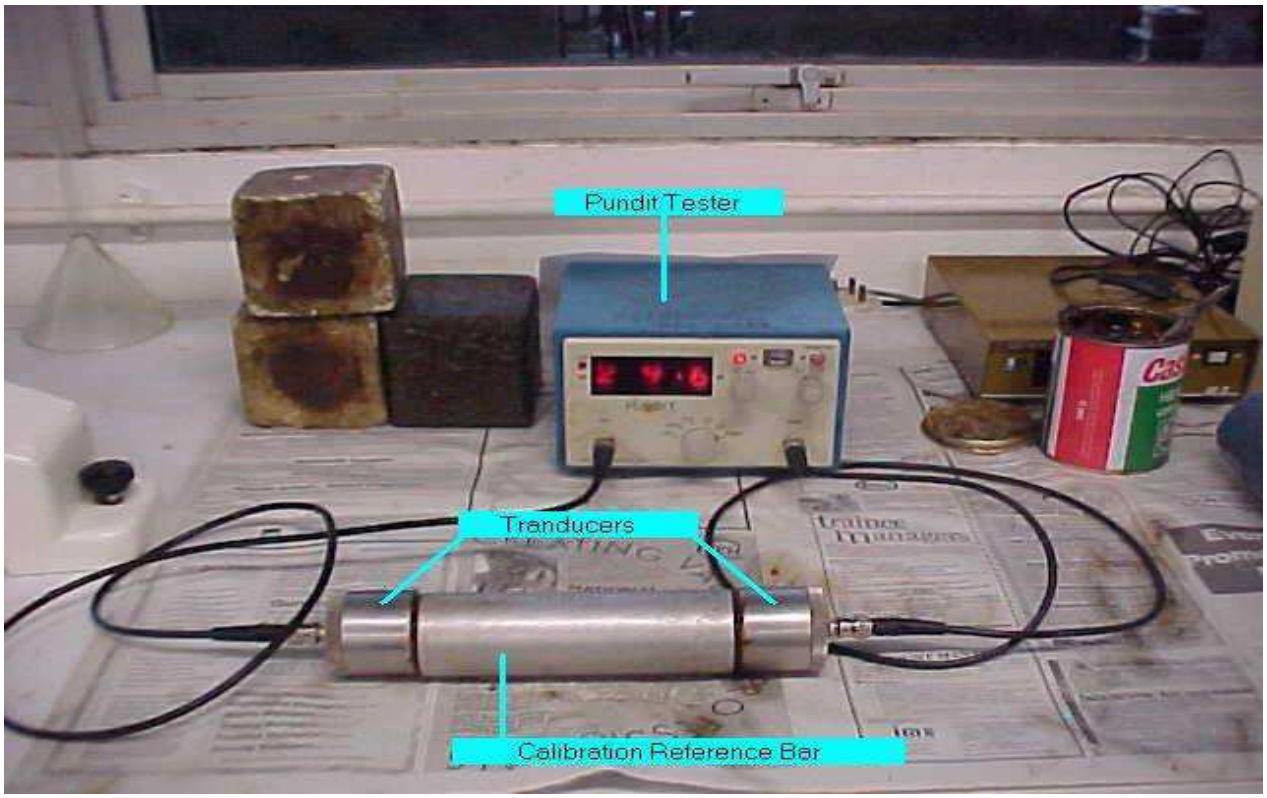


Fig. Ultrasonic Pulse Velocity Testing Instrument

The influence of path length will be negligible provided it is not less than 100mm when 20mm size aggregate is used or less than 150mm for 40mm size aggregate.

Pulse velocity will not be influenced by the shape of the specimen, provided its least lateral dimension (i.e. its dimension measured at right angles to the pulse path) is not less than the wavelength of the pulse vibrations.

For pulse of 50Hz frequency, this corresponds to a least lateral dimension of about 80mm. the velocity of pulses in steel bar is generally higher than they are in concrete. For this reason pulse velocity measurements made in the vicinity of reinforcing steel may be high and not representative of the concrete.

The influence of the reinforcement is generally small if the bars runs in a direction at right angles to the pulse path and the quantity of steel is small in relation to the path length. The moisture content of the concrete can have a small but significant influence on the pulse velocity.In general, the velocity is increased with increased moisture content, the influence being more marked for lower quality concrete.

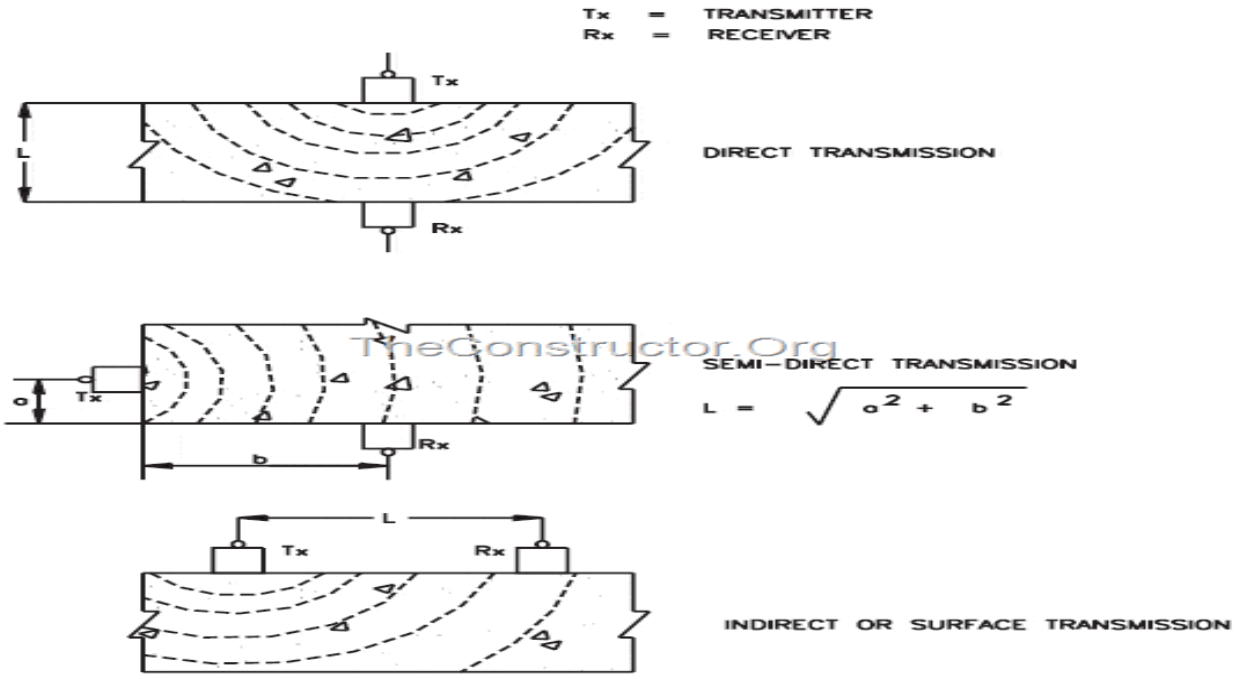


Fig. Method of propagating and receiving pulses

Measurement of pulse velocities at points on a regular grid on the surface of a concrete structure provides a reliable method of assessing the homogeneity of the concrete.

The size of the grid chosen will depend on the size of the structure and the amount of variability encountered.

Table. Concrete Quality based on Ultrasonic Pulse Velocity Test

ULSE VELOCITY	CONCRETE QUALITY
>4.0 km/s	Very good to excellent
3.5 – 4.0 km/s	Good to very good, slight porosity may exist
3.0 – 3.5 km/s	Satisfactory but loss of integrity is suspected
<3.0 km/s	Poor and los of integrity exist.

Above table shows guidelines for qualitative assessment of concrete based on UPV test results.

Below table shows the guidelines for identification of corrosion prone locations by combining the results of pulse velocity and rebound number.

Identification of Corrosion Prone Location based on Pulse Velocity and Hammer Readings

Sr.No.	Test Results	Interpretations
1	High UPV values, high rebound number	Not corrosion prone
2	Medium range UPV values, low rebound numbers	Surface delimitation, low quality of surface concrete, corrosion prone
3	Low UPV, high rebound numbers	Not corrosion prone, however to be confirmed by chemical tests, carbonation, pH
4	Low UPV, low rebound numbers	Corrosion prone, requires chemical and electrochemical tests.

Detection of Defects with Ultrasonic Test on Concrete

When ultrasonic pulse travelling through concrete meets a concrete-air interface, there is a negligible transmission of energy across this interface so that any air filled crack or void lying directly between the transducers will obstruct the direct beam of ultrasonic when the void has a projected area larger than the area of transducer faces.

The first pulse to arrive at the receiving transducer will have been directed around the periphery of the defect and the time will be longer than in similar concrete with no defect.

Estimating the depth of cracks

An estimate of the depth of a crack visible at the surface can be obtained by the transit times across the crack for two different arrangements of the transducers placed on the surface.

One suitable arrangement is one in which the transmitting and receiving transducers are placed on opposite sides of the crack and distant from it. Two values of X are chosen, one being twice that of the other, and the transmit times corresponding to these are measured.

An equation may be derived by assuming that the plane of the crack is perpendicular to the concrete surface and that the concrete in the vicinity of the crack is of reasonably uniform quality. It is important that the distance X be measured accurately and that very good coupling is developed between the transducers and the concrete surface.

The method is valid provided the crack is not filled with water.

This ultrasonic test is done as per IS: 13311 (Part 1) – 1992.

Procedure for Ultrasonic Pulse Velocity

i) **Preparing for use**: Before switching on the 'V' meter, the transducers should be connected to the sockets marked "TRAN" and " REC".

ii) The 'V' meter may be operated with either:

- The internal battery,
- An external battery or
- The A.C line.

ii) **Set reference**: A reference bar is provided to check the instrument zero. The pulse time for the bar is engraved on it. Apply a smear of grease to the transducer faces before placing it on the opposite ends of the bar. Adjust the 'SET REF' control until the reference bar transit time is obtained on the instrument read-out.

iii) **Range selection**: For maximum accuracy, it is recommended that the 0.1 microsecond range be selected for path length upto 400mm.

iv) **Pulse velocity**: Having determined the most suitable test points on the material to be tested, make careful measurement of the path length 'L'. Apply couplant to the surfaces of the transducers and press it hard onto the surface of the material.

Do not move the transducers while a reading is being taken, as this can generate noise signals and errors in measurements. Continue holding the transducers onto the surface of the material until a consistent reading appears on the display, which is the time in microsecond for the ultrasonic pulse to travel the distance 'L'.The mean value of the display readings should be taken when the units digit hunts between two values.

v) Separation of transducer leads: It is advisable to prevent the two transducer leads from coming into close contact with each other when the transit time measurements are being taken.If this is not done, the receiver lead might pick-up unwanted signals from the transmitter lead and this would result in an incorrect display of the transit time.

Pulse velocity=(Path length/Travel time)

Used destructive test

1. Compression Testing Machine(CTM)

The digital compression testing machine is used to determine the compressive strength of cube and cylinder (i.e. hardened concrete).

CTM Machine Set up



Procedure as per IS 516 – Methods of tests for strength of concrete

1. Keep the specimen to be tested centrally on the clean lower platen so that small clearance is left between the upper platen and the top the specimen under test.

2. Close the pressure release valve.

3. Make the digital display to read “Zero” by adjusting the zero knobs.

4. Put the display unit on “Peak Hold” mode to hold the maximum load reading.

5. Start applying the load at the specified pace rate, which could be maintained by adjusting the slow fast knob.

6. If the pace rate is on higher side the indicator displays red color and the pace rate is on lower side the indicator will display yellow color.

7. If the pace rate is exactly equal to set rate then the indicator will display green color.

8. As soon as sample fails, release the pressure slowly by opening valve.

9. The digital display will be holding the maximum load reading at which sample has failed. Note down the pattern of failure and calculate the compressive strength in N/mm^2 or kg/cm^2.

10. Pace rate for 15 cm cube is 5.15 kN/s.

11. Before starting another test, clean the lower platen and bring the digital display to “Zero” position by depressing the “Reset” switch.

Chapter 4

Experimental work

Material used

Cement

Table. Physical Properties of cement

Sr. No	Properties	Chart results
1	Specific gravity	3.11
2	Fineness	2.00%
3	Normal Consistency	33.00%
4	Initial setting time	34 minutes

Fine Aggregates

Locally available river sand, passing through 4.75mm sieve and retained on 150 micron and free from impurities is used for the work. The tests were conducted as per IS 2386-1975 and result of sieve analysis and physical properties of fine aggregates are shown below

Table. Physical Properties of Fine Aggregate

Sr no	Property	Chart results
1	Specific gravity	2.416
2	Water absorption	2.04%
3	Bulk density	1720 Kg/m3

Table. Sieve Analysis Results of Fine Aggregates

Sr no	IS Sieve Size	Cumulative % passing
1	10mm	100
2	4.75mm	97
3	2.36mm	92.4
4	1.18mm	69.2
5	600 micron	39.8
6	300 micron	3.4
7	150 micron	0.02
8	Pan	0

Coarse aggregate

Crushed stone of 20mm down size and 12.5mm were used in this present work. The sieve analysis result and physical properties of coarse aggregate of 20mm down and 12.5mm size are shown in following tables.

Table. Physical Properties of Coarse Aggregate

Size of aggregate	20 mm	12.5 mm
specific gravity	2.773	2.8
water absorption	1.50%	2.53
bulk density	1570 kg/m^3	1562 kg/m^3

Table. Sieve Analysis Results of Coarse Aggregate

Sr.No	IS Sieve size	Cumulative % passing	
		20mm	12.5mm
1	40mm	100	100
2	20mm	61.62	100
3	12.5mm	3.04	96.7
4	10mm	1.02	88.89
5	4.75mm	0.01	2.03
6	Pan	0	0

Mix design

Using the physical properties of cement, fine aggregate and coarse aggregate concrete mix was designed for M- 20 grade concrete. The concrete mix is designed as per IS 10262:2009 for the M-20 Grade of concrete for two different water-cement ratios such as 0.55 and 0.53.The mix proportions are presented in following table.

Table. Mix proportions

Sr no	w/c ratio	Cement	FA	CA
1	0.53	361.67	378.78	1150.83
2	0.55	348.32	689.42	1149.79

Casting

Six numbers of cubes of size 150*150*150 were casted which are tested by Rebound hammer test, Ultrasonic pulse velocity test and by Compression testing machine for getting compressive strength of concrete.

Curing

The casted concrete cubes demoded after 24 hours. Out of which two are kept in water tank for 7 days, two for 28 days and 2 are tested for 7 days without curing.

Fly ash

Fly ash can be used as prime material in many cement-based products, such as poured concrete, concrete block, and brick. One of the most common uses of fly ash is in Portland cement concrete pavement or PCC pavement.

Nylon fibers

The nylon fiber is used in variety of applications owing to its high strength, resilience and durability but their disposals pose a serious threat in environment. The use of nylon fiber in concrete hence gives good alternative to the disposal and fibers in turn impart useful characteristics to concrete. In present study, various proportions of nylon fiber are added in concrete and its effect on workability, compressive strength and tensile strength is reported.

Compressive Strength of Concrete -Cube Test, Procedure, Results

Compressive strength of concrete cube test provides an idea about all the characteristics of concrete. By this single test one judge that whether Concreting has been done properly or not. Concrete compressive strength for general construction varies from 15 MPa (2200 psi) to 30 MPa (4400 psi) and higher in commercial and industrial structures.

Compressive strength of concrete depends on many factors such as water-cement ratio, cement strength, quality of concrete material, and quality control during production of concrete etc.

Test for compressive strength is carried out either on cube or cylinder. Various standard codes recommend concrete cylinder or concrete cube as the standard specimen for the test. American Society for Testing Materials ASTM C39/C39M provides Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

Compressive Strength Definition

Compressive strength is the ability of material or structure to carry the loads on its surface without any crack or deflection. A material under compression tends to reduce the size, while in tension, size elongates.

Compressive Strength Formula

Compressive strength formula for any material is the load applied at the point of failure to the cross-section area of the face on which load was applied.

Compressive Strength = Load / Cross-sectional Area

Procedure: Compressive Strength Test of Concrete Cubes

For cube test two types of specimens either cubes of 15cm X 15cm X 15cm or 10cm X 10cm x 10cm depending upon the size of aggregate are used. For most of the works cubical moulds of size 15cm x 15cm x 15cm are commonly used.



This concrete is poured in the mould and tempered properly so as not to have any voids. After 24 hours these moulds are removed and test specimens are put in water for curing. The top surface of these specimens should be made even and smooth. This is done by putting cement paste and spreading smoothly on whole area of specimen.

These specimens are tested by compression testing machine after 7 days curing or 28 days curing. Load should be applied gradually at the rate of 140 kg/cm2 per minute till the Specimens fails. Load at the failure divided by area of specimen gives the compressive strength of concrete.

Following are the procedure for testing Compressive strength of Concrete Cubes

Apparatus for Concrete Cube Test

Compression testing machine

Preparation of Concrete Cube Specimen

The proportion and material for making these test specimens are from the same concrete used in the field.

Specimen

6 cubes of 15 cm size Mix. M15 or above

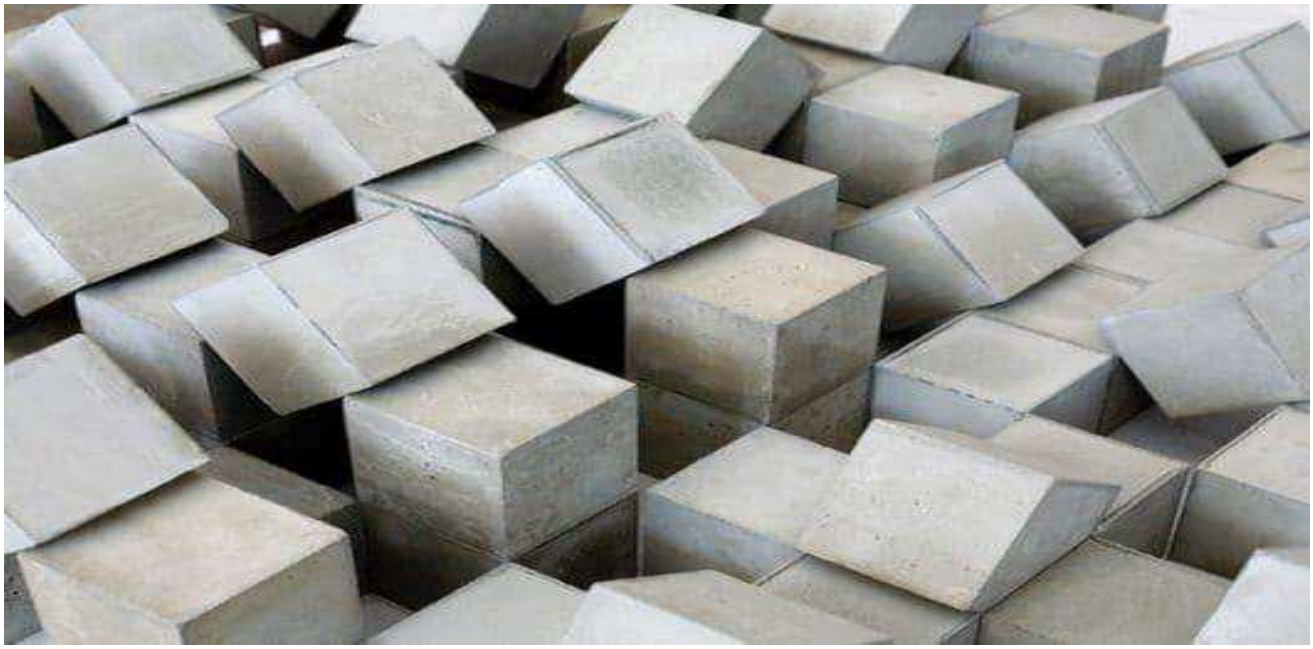
Mixing of Concrete for Cube Test

Mix the concrete either by hand or in a laboratory batch mixer

Hand Mixing

Mix the cement and fine aggregate on a water tight none-absorbent platform until the mixture is thoroughly blended and is of uniform color

1. Add the coarse aggregate and mix with cement and fine aggregate until the coarse aggregate is uniformly distributed throughout the batch
2. Add water and mix it until the concrete appears to be homogeneous and of the desired consistency



Sampling of Cubes for Test

1. Clean the mounds and apply oil
2. Fill the concrete in the molds in layers approximately 5 cm thick
3. Compact each layer with not less than 35 strokes per layer using a tamping rod (steel bar 16mm diameter and 60cm long, bullet pointed at lower end)
4. Level the top surface and smoothen it with a trowel

Curing of Cubes

The test specimens are stored in moist air for 24 hours and after this period the specimens are marked and removed from the molds and kept submerged in clear fresh water until taken out prior to test.

Precautions for Tests

The water for curing should be tested every 7 days and the temperature of water must be at 27+-2oC.

Procedure for Concrete Cube Test

1. Remove the specimen from water after specified curing time and wipe out excess water from the surface.
2. Take the dimension of the specimen to the nearest 0.2m
3. Clean the bearing surface of the testing machine
4. Place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast.
5. Align the specimen centrally on the base plate of the machine.
6. Rotate the movable portion gently by hand so that it touches the top surface of the specimen.
7. Apply the load gradually without shock and continuously at the rate of 140 kg/cm^2/minute till the specimen fails
8. Record the maximum load and note any unusual features in the type of failure.

Note:

Minimum three specimens should be tested at each selected age. If strength of any specimen varies by more than 15 percent of average strength, results of such specimen should be rejected. Average of three specimens gives the crushing strength of concrete. The strength requirements of concrete.

Calculations of Compressive Strength

Size of the cube =15cmx15cmx15cm

Area of the specimen (calculated from the mean size of the specimen)=225 cm^2
Characteristic compressive strength(f ck)at 7 days =

Expected maximum load =fck x area x f.s

Range to be selected is ……..

Similar calculation should be done for 28 day compressive strength

Maximum load applied =…….tones = ……..N

Compressive strength = (Load in N/ Area in $mm^{2)}$=……N/mm^2
=…….N/mm^2

Reports of Cube Test

1. Identification mark
2. Date of test
3. Age of specimen
4. Curing conditions, including date of manufacture of specimen
5. Appearance of fractured faces of concrete and the type of fracture if they are unusual

Results of Concrete Cube Test

Average compressive strength of the concrete cube = ……..N/ mm^2 (at 7 days)
Average compressive strength of the concrete cube =……. N/mm^2 (at 21 days)
Average compressive strength of the concrete cube =……. N/mm^2 (at 28 days)

Table. Compressive Strength of Concrete at Various Ages

Age	Strength percent
1 day	16%
3 days	40%
7 days	65%
14 days	90%
28 days	99%

The strength of concrete increases with age. Table shows the strength of concrete at different ages in comparison with the strength at 28 days after casting.

Table. Compressive Strength of Different Grades of Concrete at 7 and 28

days Grade of Concrete	Minimum compressive strength N/mm^2 at 7 days	Specified characteristic compressive strength (N/mm^2) at 28 days
M15	10	15
M20	13.5	20
M25	17	25
M30	20	30
M35	23.5	35
M40	27	40
M45	30	45

Chapter 5

Result and discussion

Readings are as given below…

For M20 grade μ=0.2

Sr.no.	name of test	days	type of concrete	with curing	without curing
1	UPV(μ=0.2)	7	conventional	4854	4491
			with admixture	4559	4630
		21	conventional	4808	4559
			with admixture	3538	3856
		28	conventional	4054	4559
			with admixture	4630	4065
2	Rebound Hammer	7	conventional	19	21
			with admixture	13.5	14
		21	conventional	22	18
			with admixture	16.5	15.5
		28	conventional	20	24.5
			with admixture	17.5	18.5
3	CTM	7	conventional	26.667	21.12
			with admixture	15.111	15.111
		21	conventional	25.778	25.778
			with admixture	25.77	16
		28	conventional	36.889	37.778
			with admixture	22.22	18.66

For M20 grade μ=0.5

sr no	name of test	days	type of concrete	with curing	without curing
1	UPV(μ=0.5)	7	conventional	4934	4559
			with admixture	4425	4425
		21	conventional	5017	4491
			with admixture	4491	3807
		28	conventional	4934	4425
			with admixture	4777	4178
2	Rebound Hammer	7	conventional	19	21
			with admixture	13.5	14
		21	conventional	22	18
			with admixture	16.5	15.5
		28	conventional	20	24.5
			with admixture	17.5	18.5
3	CTM	7	conventional	26.667	21.12
			with admixture	15.111	15.111
		21	conventional	25.778	25.778
			with admixture	25.77	16
		28	conventional	36.889	37.778
			with admixture	22.22	18.66

For M25 grade μ=0.2

sr no	name of test	days	type of concreate	with curing	without curing
1	**UPV(μ=0.2)**	7	conventional	4702	4491
			with admixture	4777	4360
		21	conventional	4823	4630
			with admixture	4630	4298
		28	conventional	5102	4491
			with admixture	4963	4352
2	**Rebound Hammer**	7	conventional	17.5	19.5
			with admixture	14.5	10.5
		21	conventional	25.5	20.5
			with admixture	16.5	14.5
		28	conventional	24.5	22
			with admixture	23.63	18.31
3	**CTM**	7	conventional	27.11	20.44
			with admixture	18.222	12.22
		21	conventional	34.22	31.11
			with admixture	30.66	22.22
		28	conventional	33.33	16.889
			with admixture	20.44	19.11

For M25 grade μ=0.5

sr no	name of test	days	type of concreate	with curing	without curing
1	**UPV(μ=0.5)**	7	conventional	4777	4491
			with admixture	4777	4023
		21	conventional	4902	4601
			with admixture	4854	4178
		28	conventional	4966	4425
			with admixture	5023	4233
2	**Rebound Hamme**	7	conventional	17.5	19.5
			with admixture	14.5	10.5
		21	conventional	25.5	20.5
			with admixture	16.5	14.5
		28	conventional	24.5	22
			with admixture	23.63	18.31
3	**CTM**	7	conventional	27.11	20.44
			with admixture	18.222	12.22
		21	conventional	34.22	31.11
			with admixture	30.66	22.22
		28	conventional	33.33	16.889
			with admixture	20.44	19.11

For M30 μ=0.2

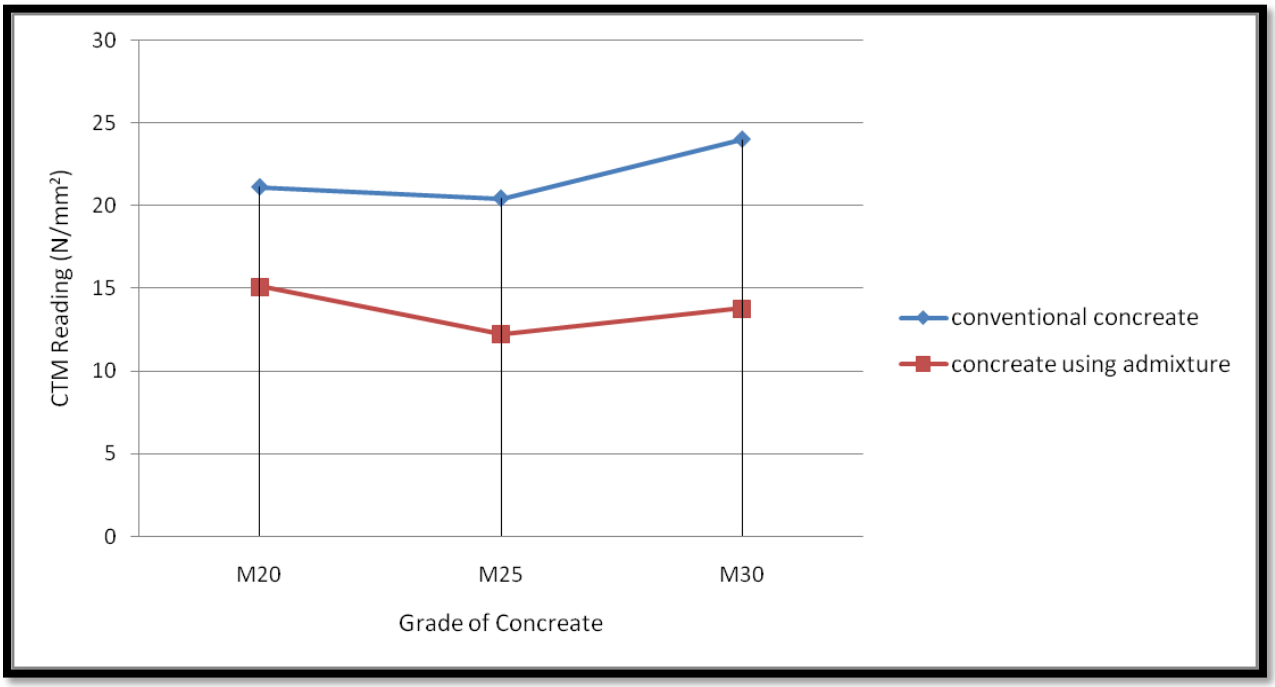
sr no	name of test	days	type of concreate	with curing	without curing
1	**UPV(μ=0.2)**	7	conventional	4425	4702
			with admixture	4491	4011
		21	conventional	4934	4777
			with admixture	4788	4423
		28	conventional	4854	4559
			with admixture	4712	4265
2	**Rebound Hammer**	7	conventional	12.5	19.5
			with admixture	15	12.5
		21	conventional	16.5	20.5
			with admixture	13.67	13.93
		28	conventional	30.73	26.63
			with admixture	31.33	25.64
3	**CTM**	7	conventional	24.88	24
			with admixture	14	13.778
		21	conventional	24.44	19.111
			with admixture	23.32	15.21
		28	conventional	33.778	18.667
			with admixture	31.13	17.66

For M30 μ=0.5

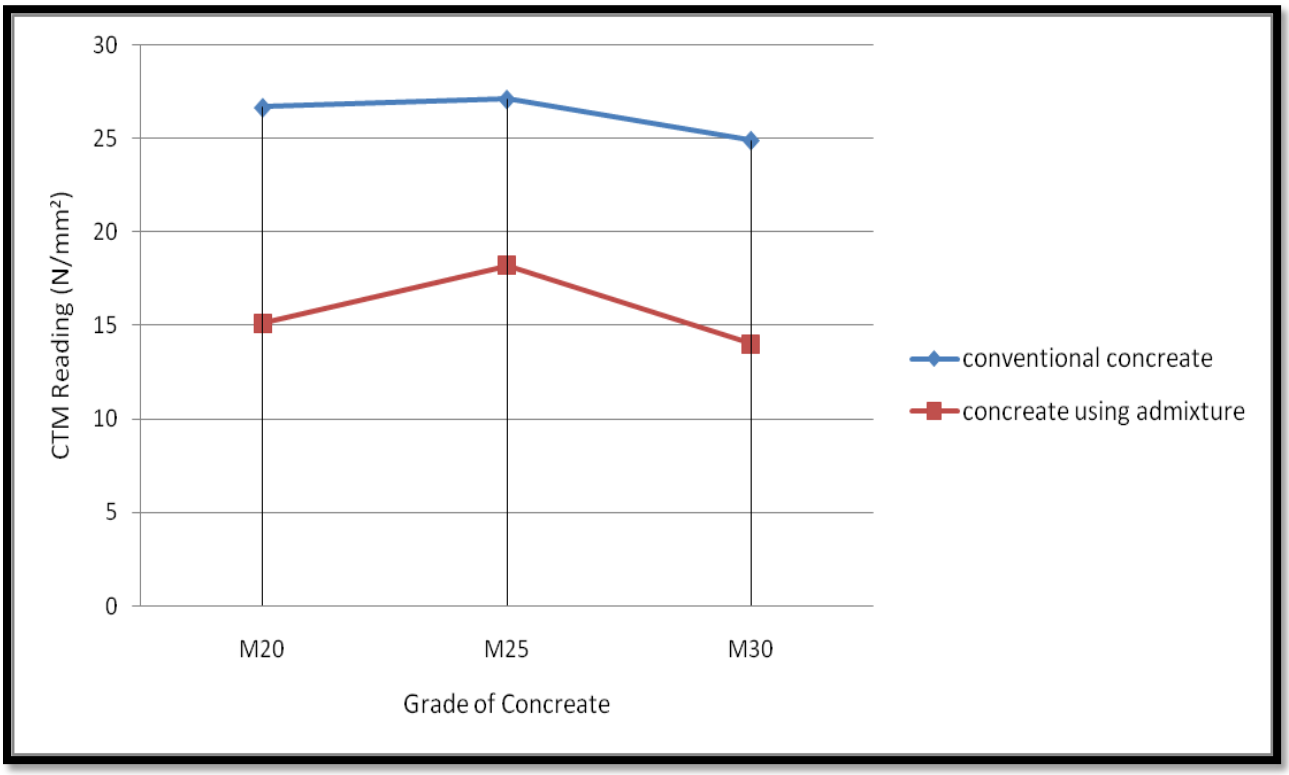
sr no	name of test	days	type of concreate	with curing	without curing
1	**UPV(μ=0.5)**	7	conventional	4559	4702
			with admixture	4360	4121
		21	conventional	4854	4702
			with admixture	4736	4650
		28	conventional	4934	4559
			with admixture	4823	4256
2	**Rebound Hammer**	7	conventional	12.5	19.5
			with admixture	15	12.5
		21	conventional	16.5	20.5
			with admixture	13.67	13.93
		28	conventional	30.73	26.63
			with admixture	31.33	25.64
3	**CTM**	7	conventional	24.88	24
			with admixture	14	13.778
		21	conventional	24.44	19.111
			with admixture	23.32	15.21
		28	conventional	33.778	18.667
			with admixture	31.13	117.66

Compression Testing Machine (CTM)

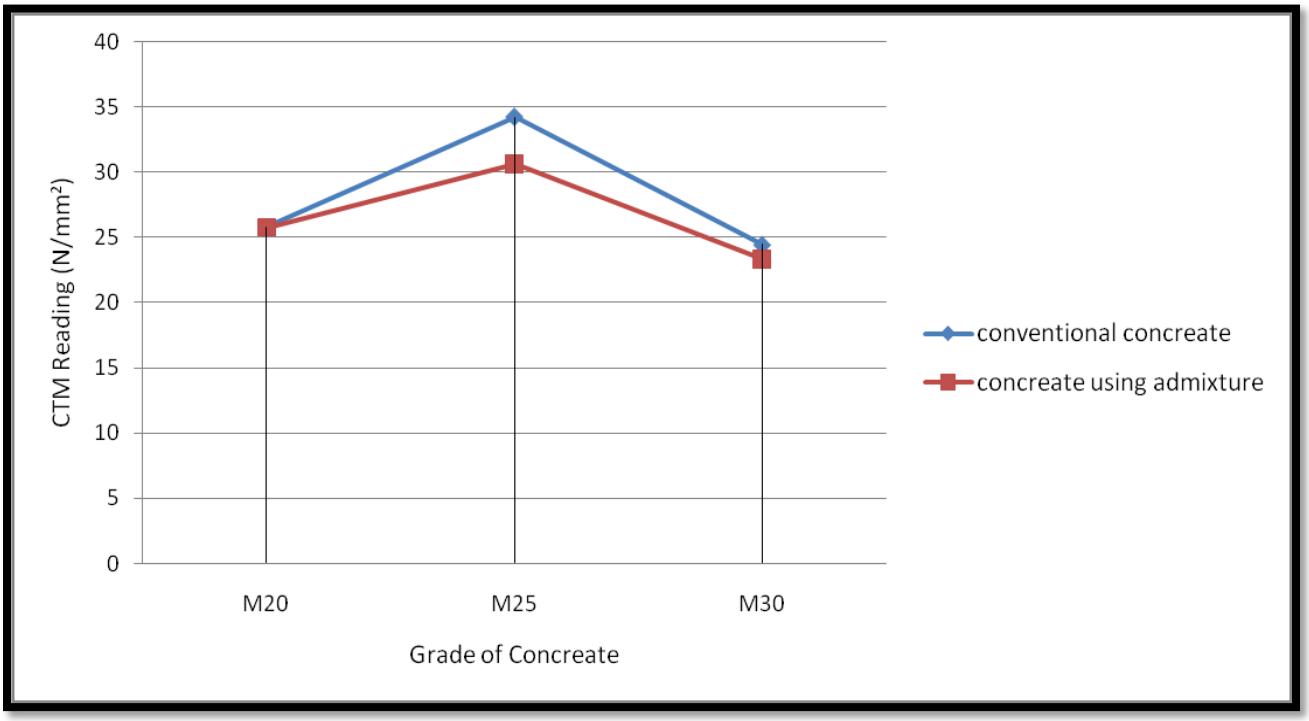
CTM 7 day with curing



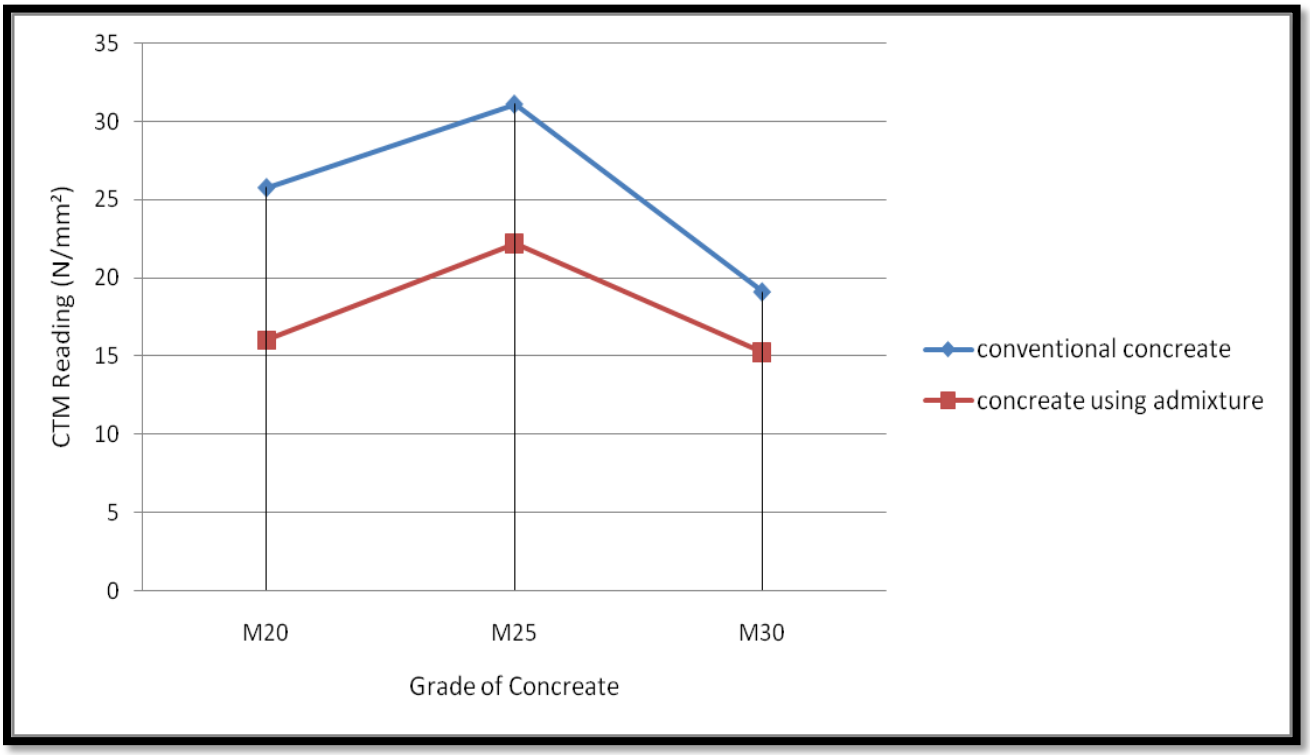
CTM 7 day without curing



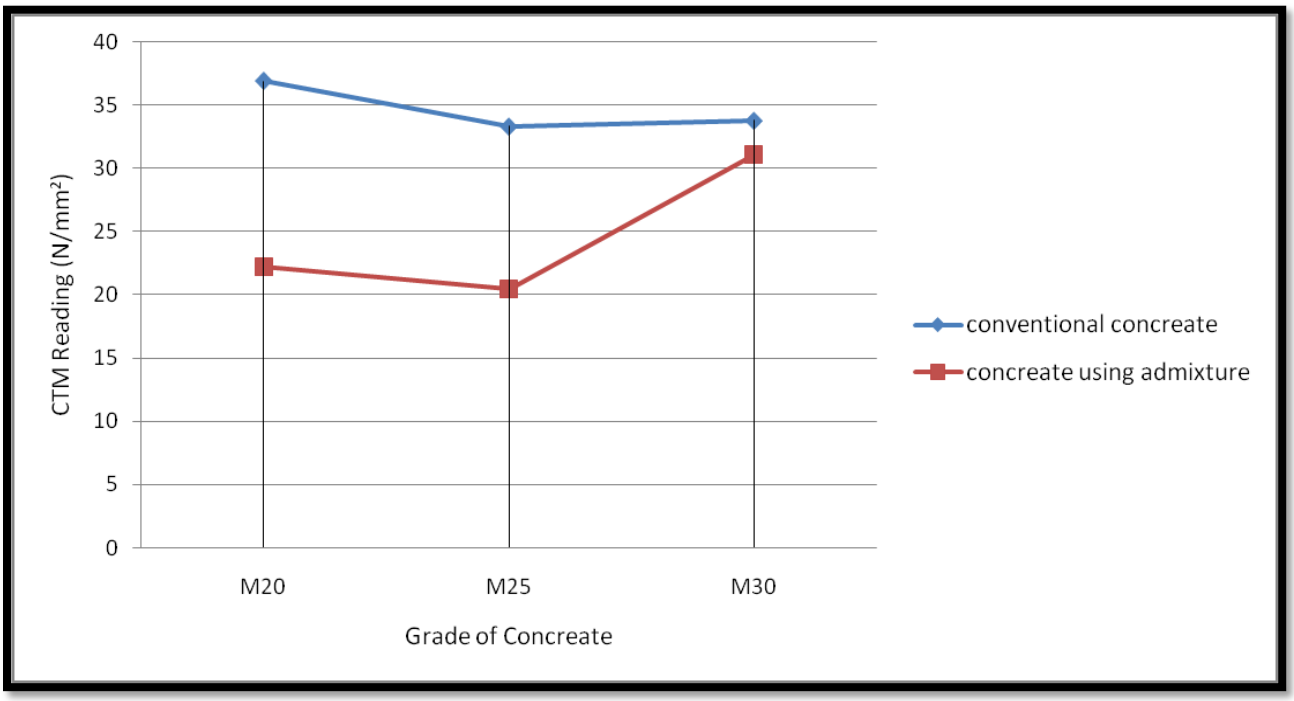
CTM 21day with curing



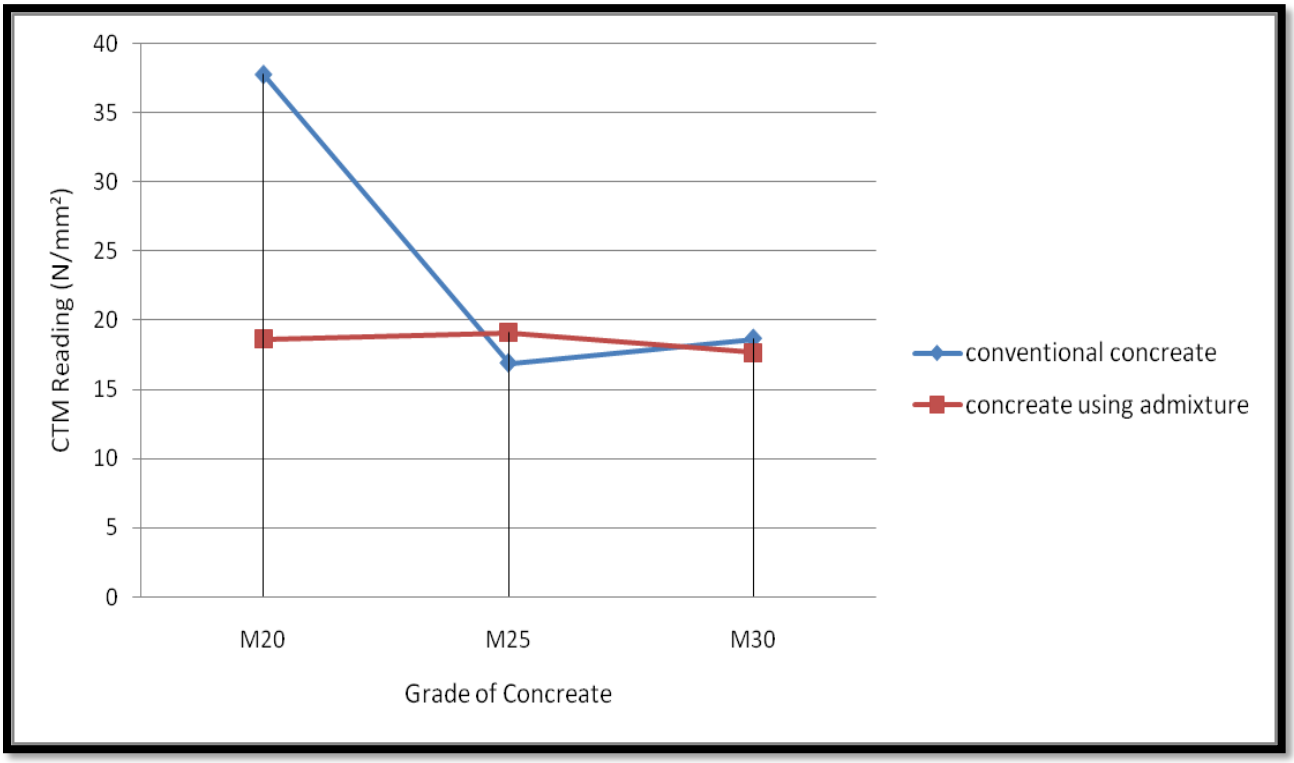
CTM 21day without curing



CTM 28day with curing

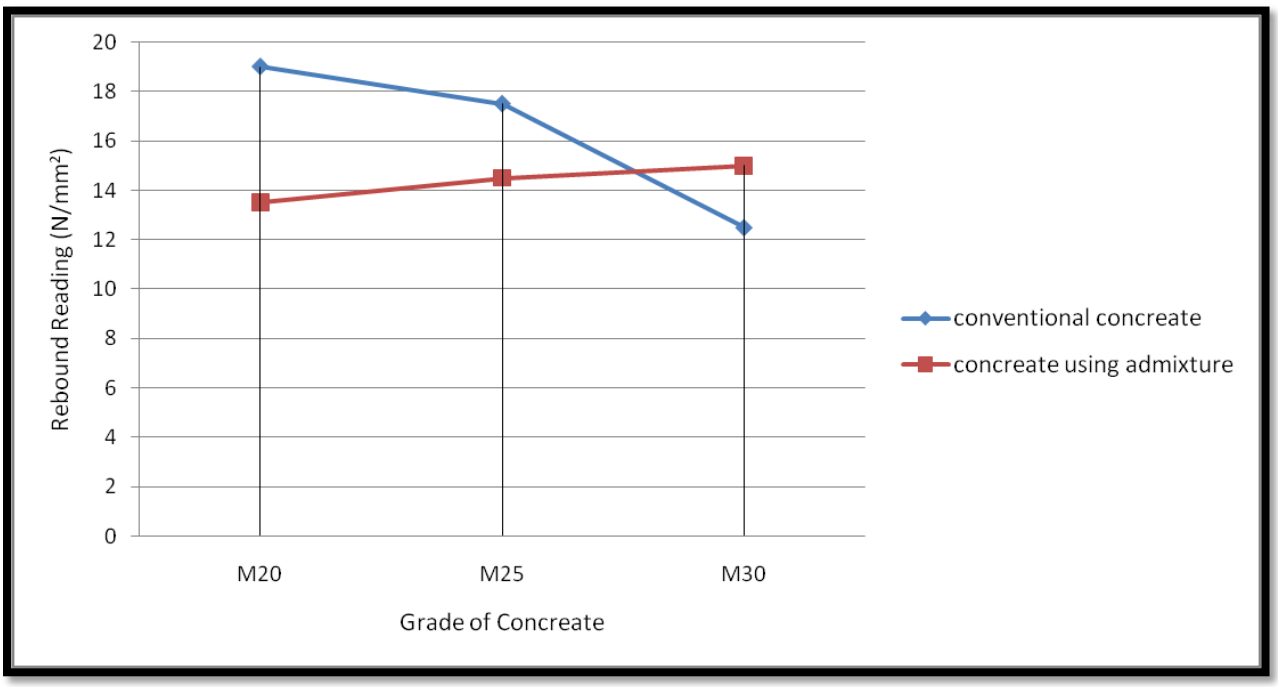


CTM 28day without curing

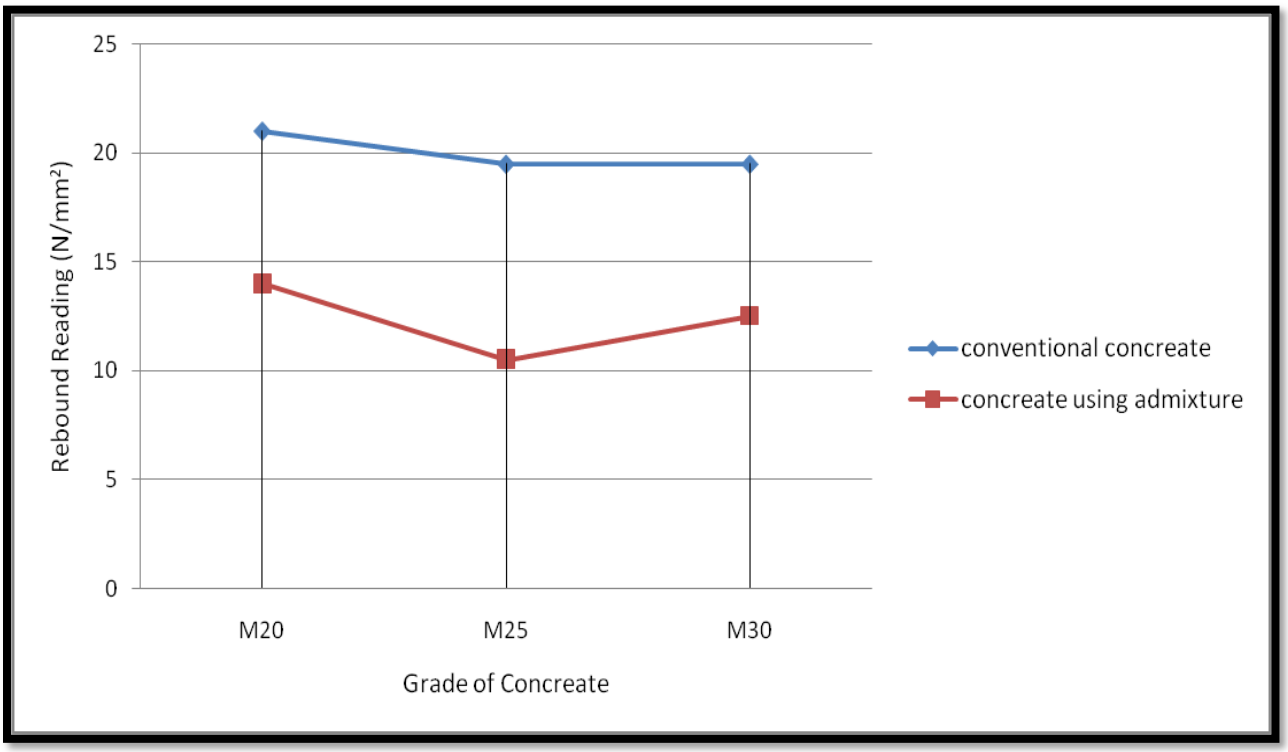


Rebound hammer 7 day with curing

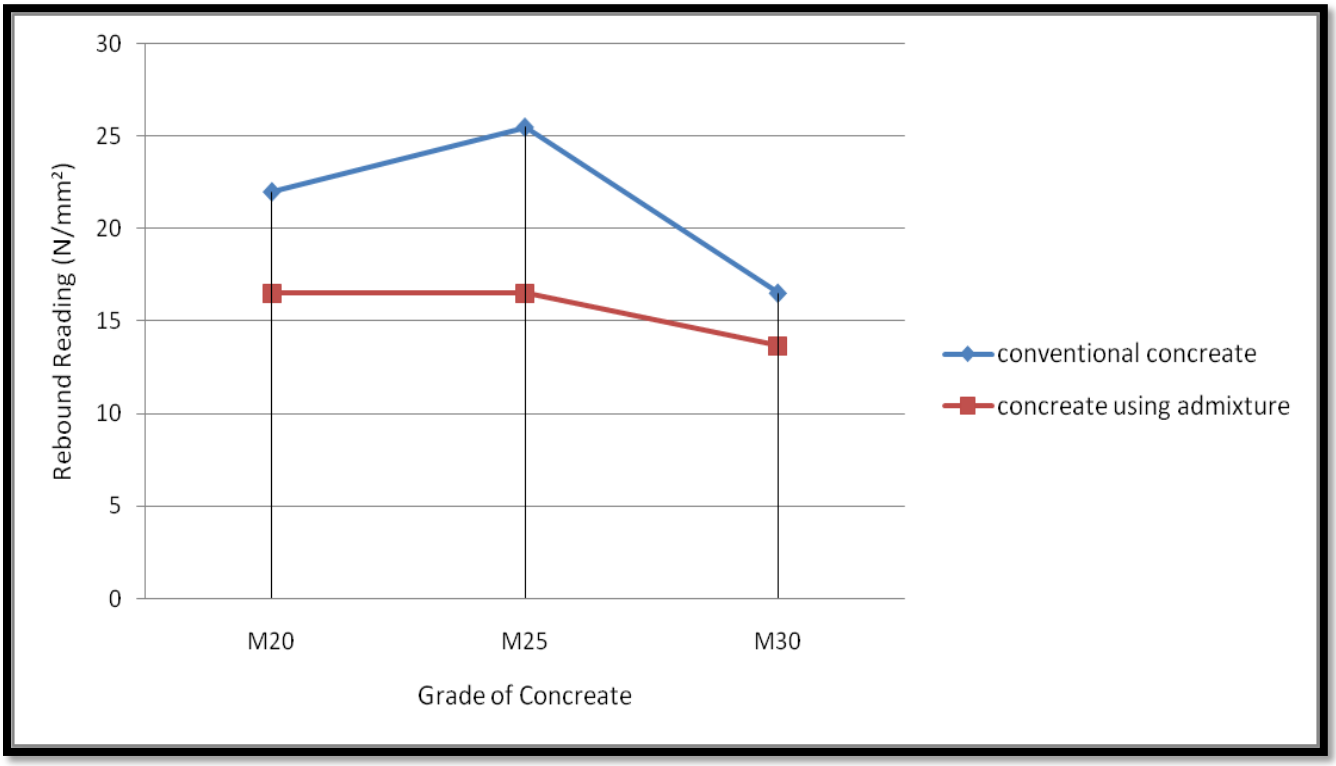
Rebound hammer 7 day with curing



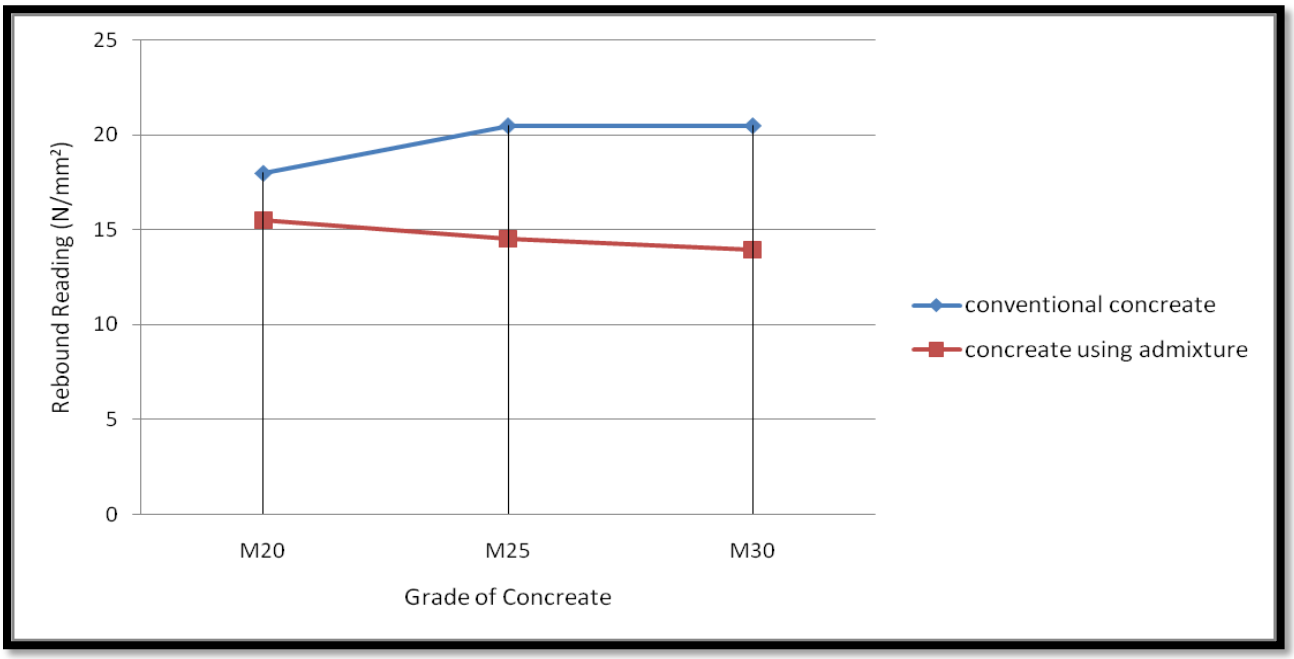
Rebound hammer 7 day without curing



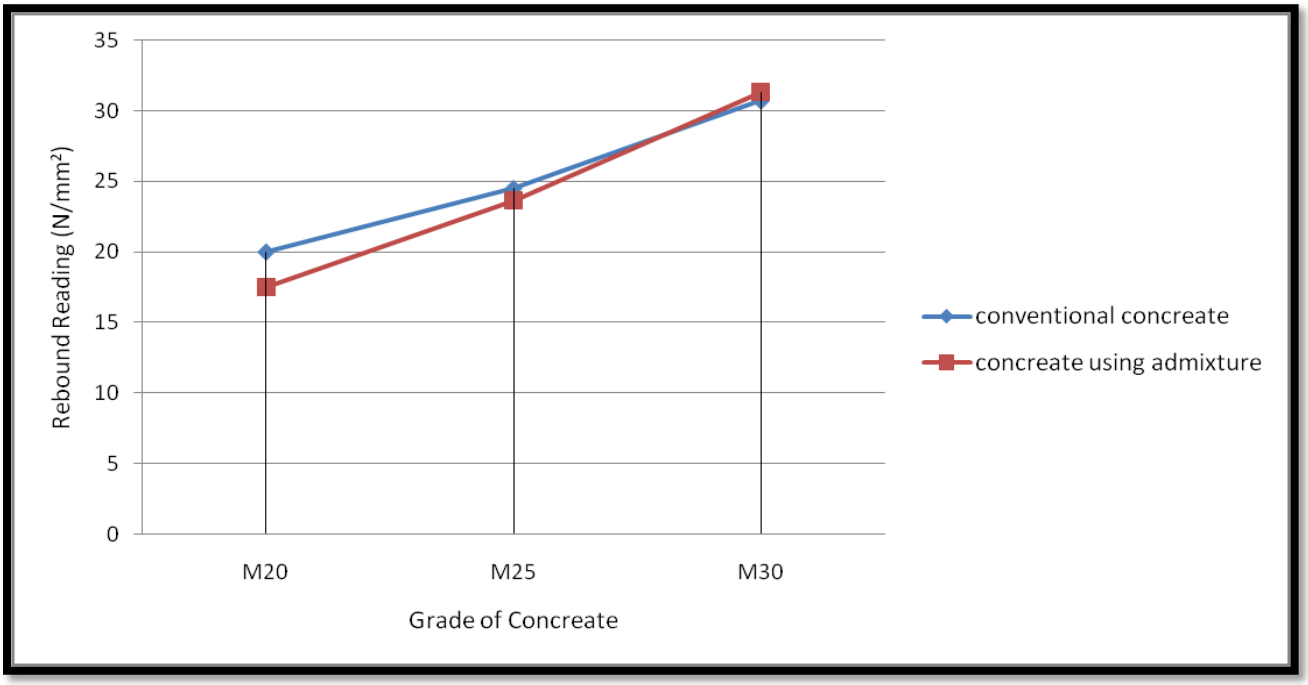
Rebound hammer 21day with curing



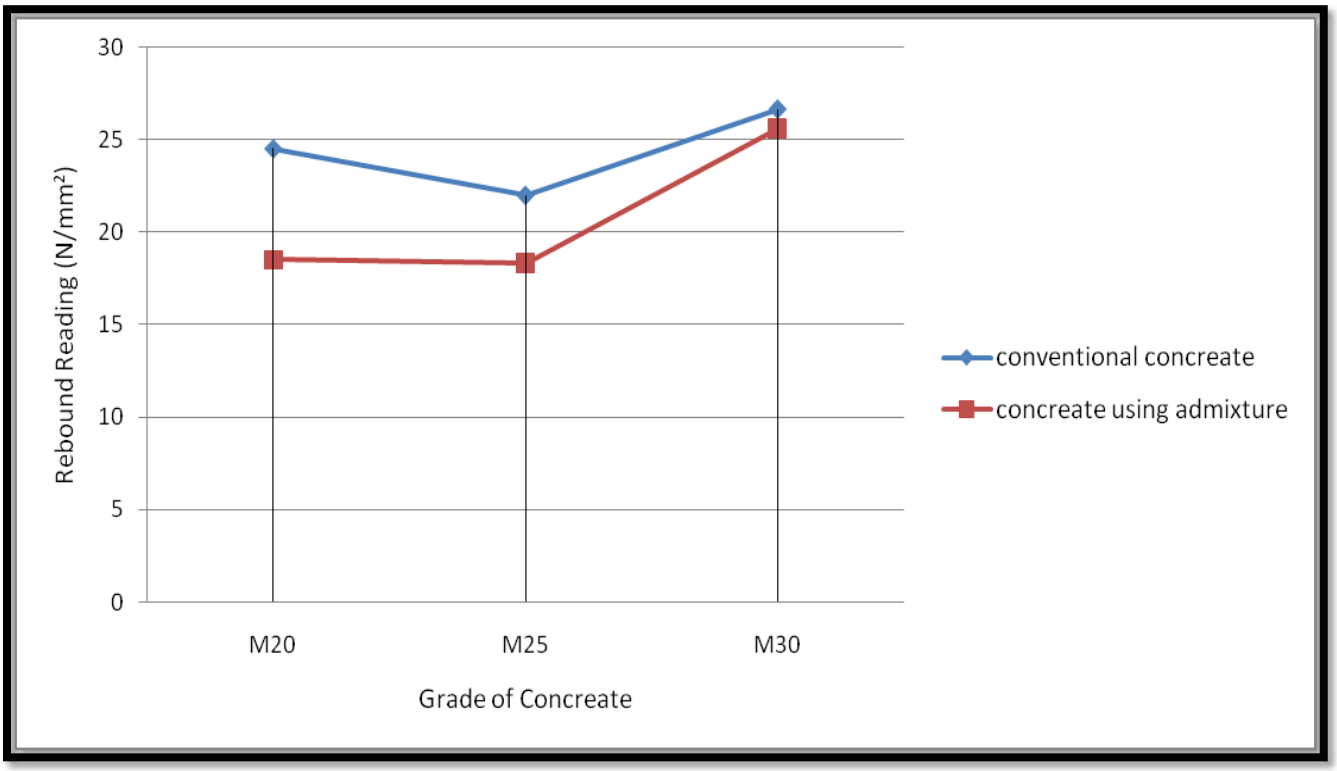
Rebound hammer 21day without curing



Rebound hammer 28 day with curing

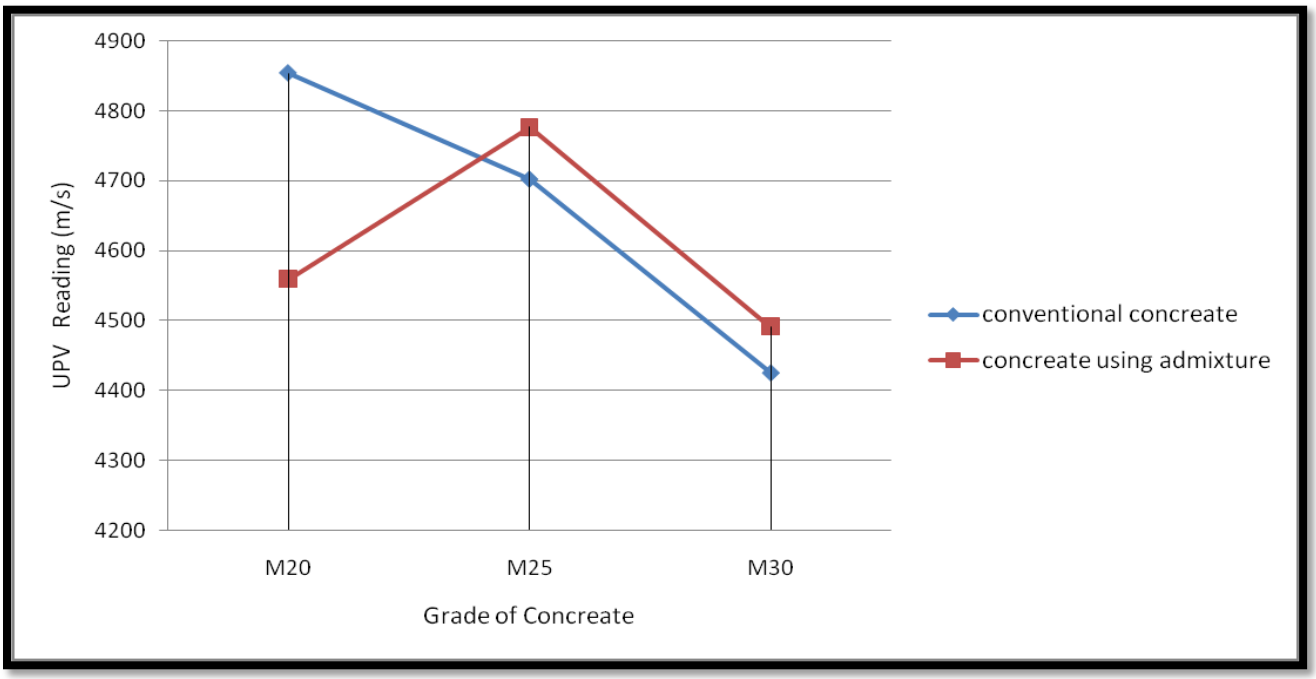


Rebound hammer 28 day without curing

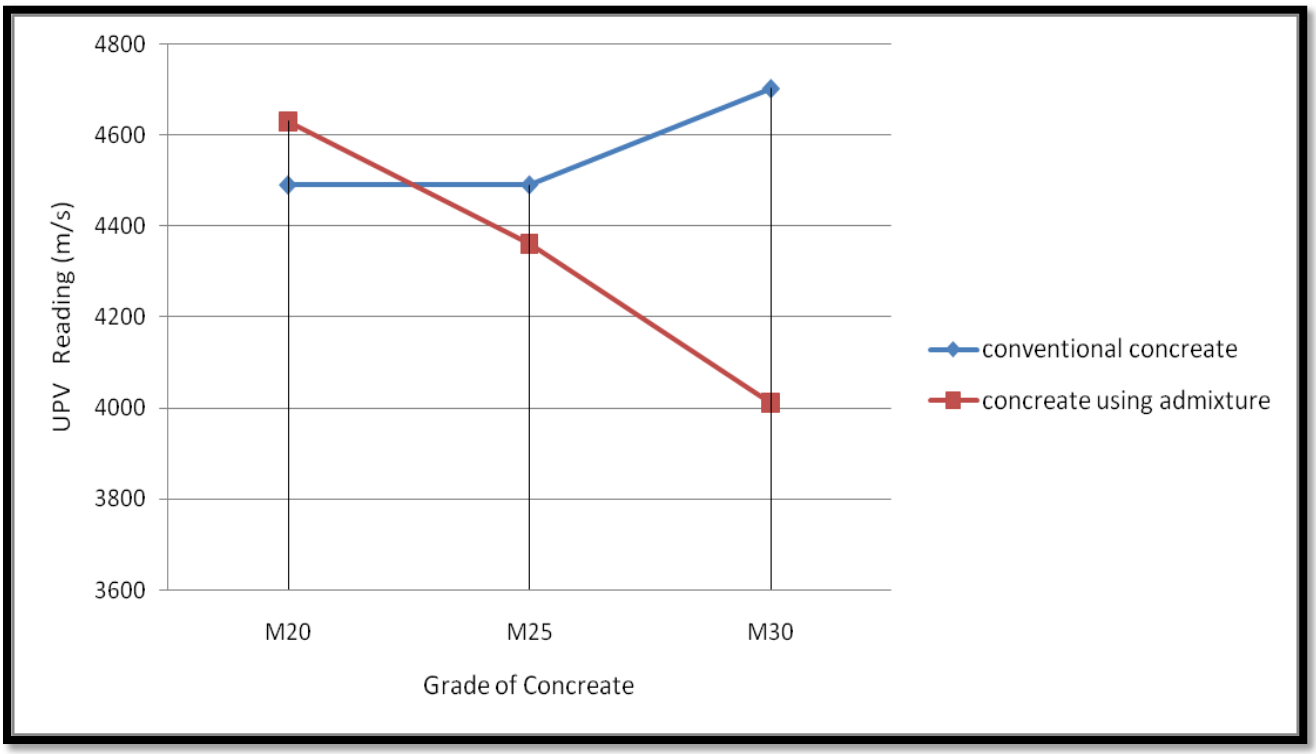


Ultrasonic pulse velocity

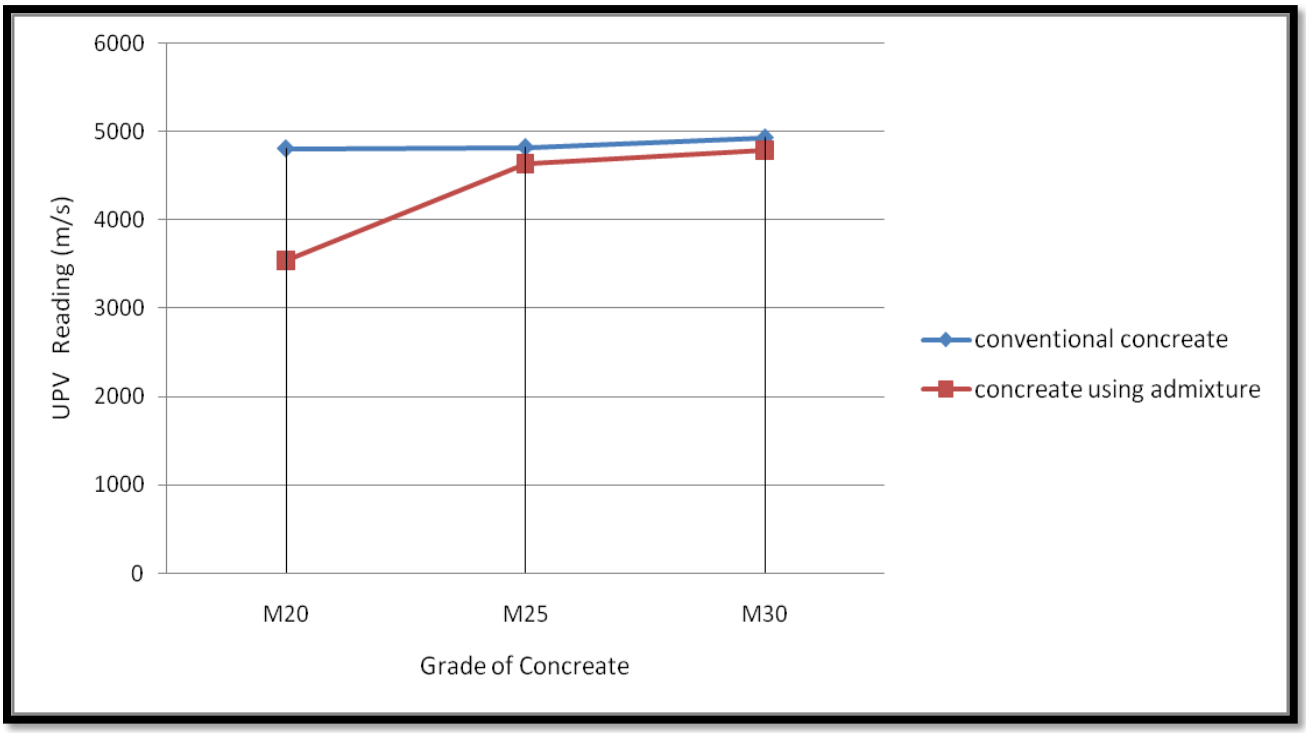
7 days ultrasonic pulse velocity μ=0.2 with curing



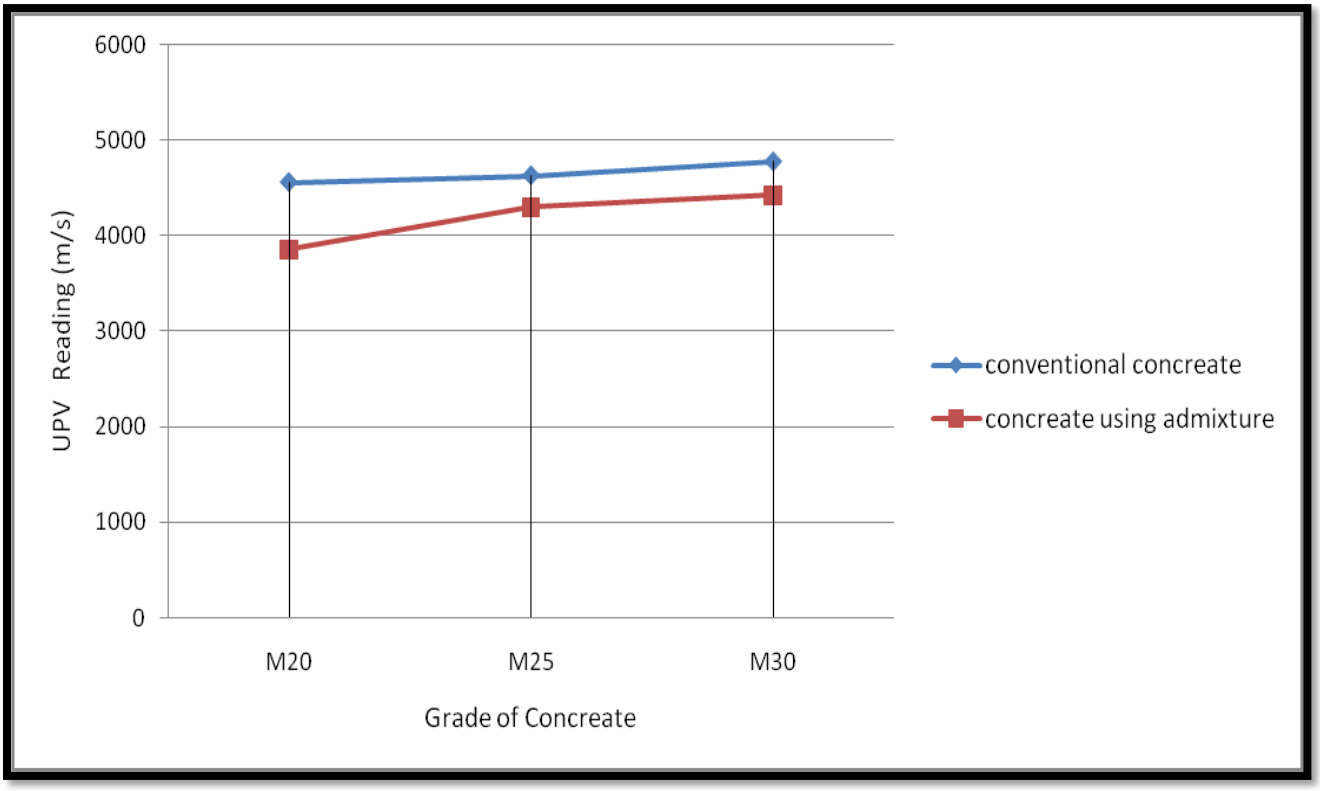
7 days ultrasonic pulse velocity μ=0.2 without curing



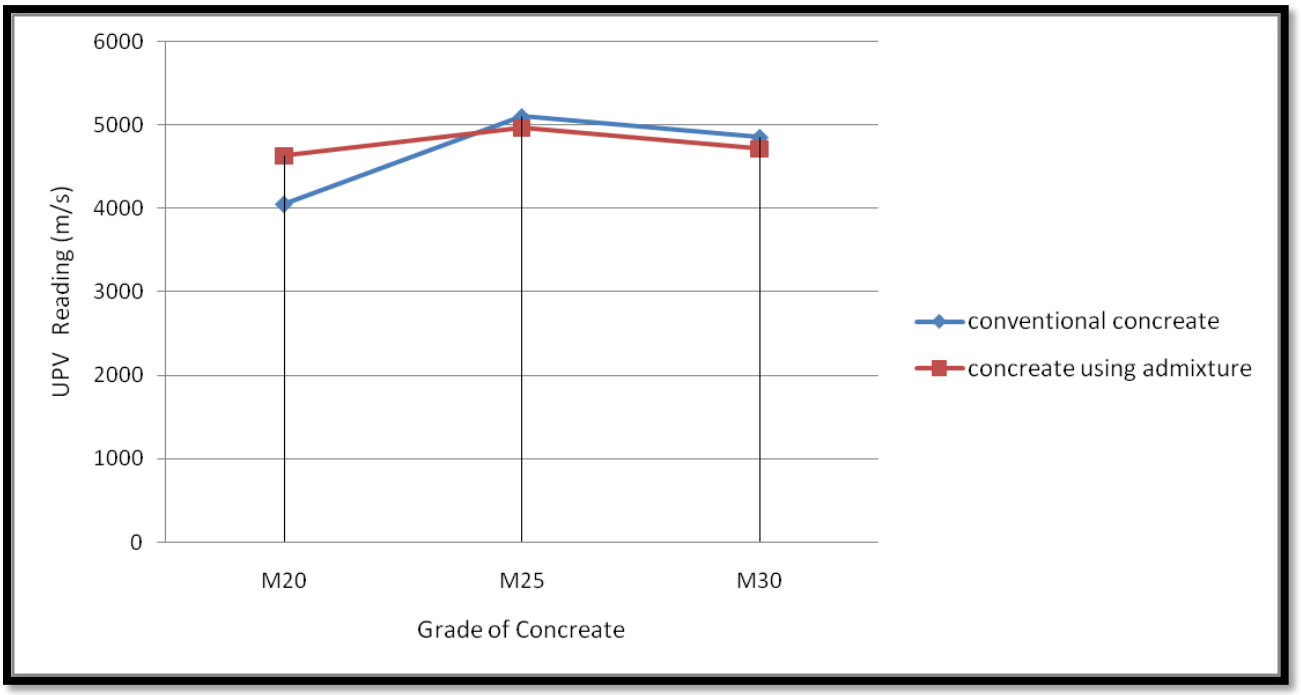
21 days ultrasonic pulse velocity μ=0.2 with curing



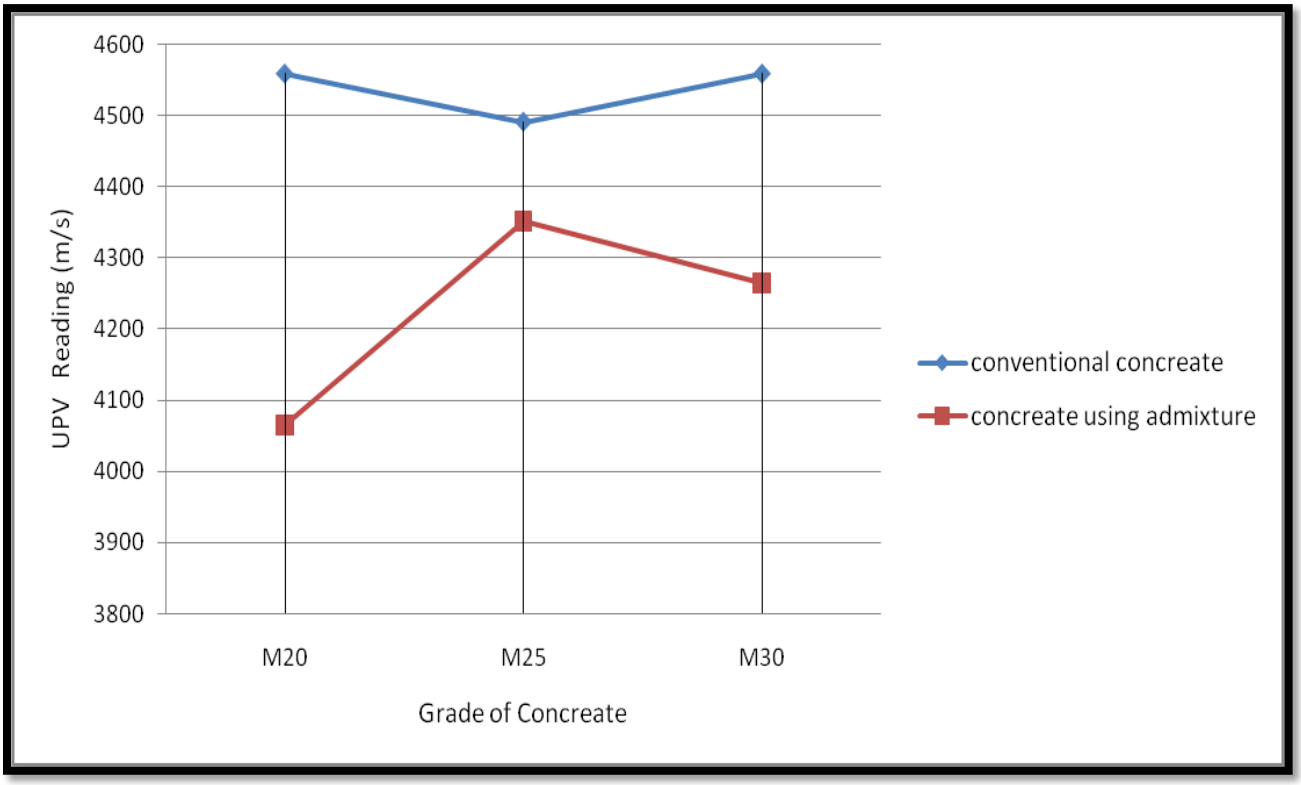
21 days ultrasonic pulse velocity μ=0.2 without curing



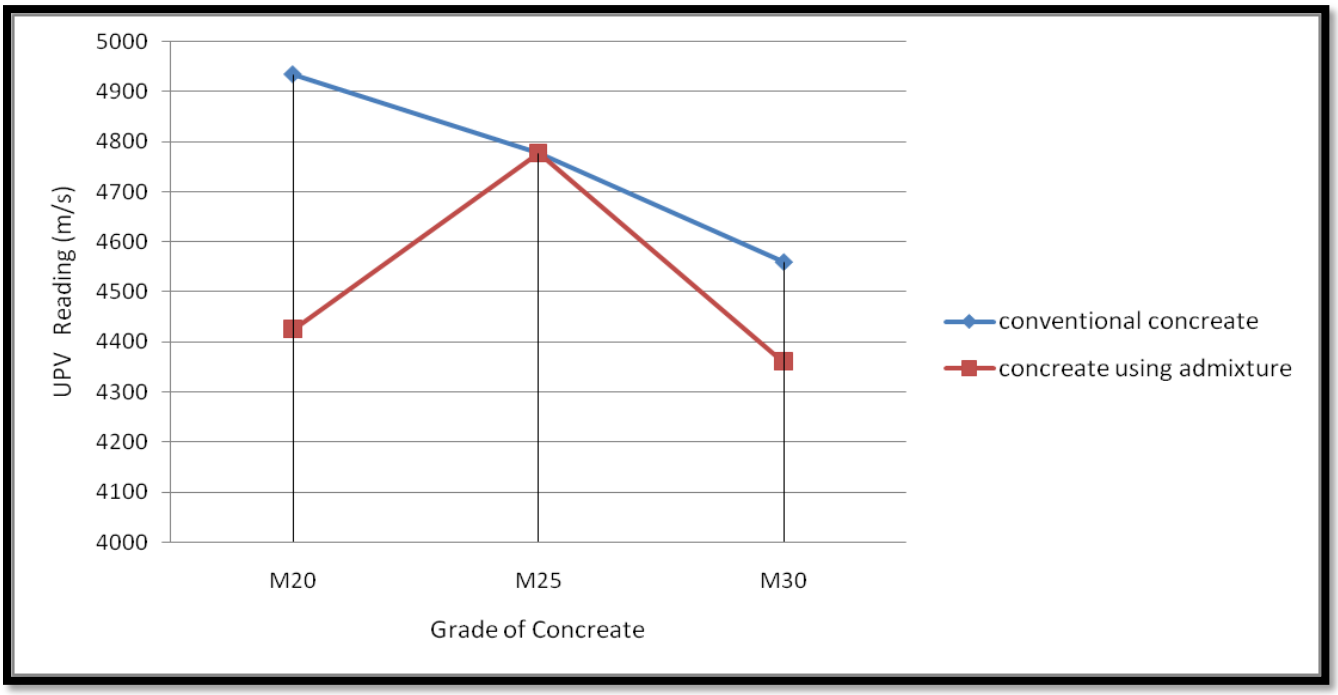
28 days ultrasonic pulse velocity μ=0.2 with curing



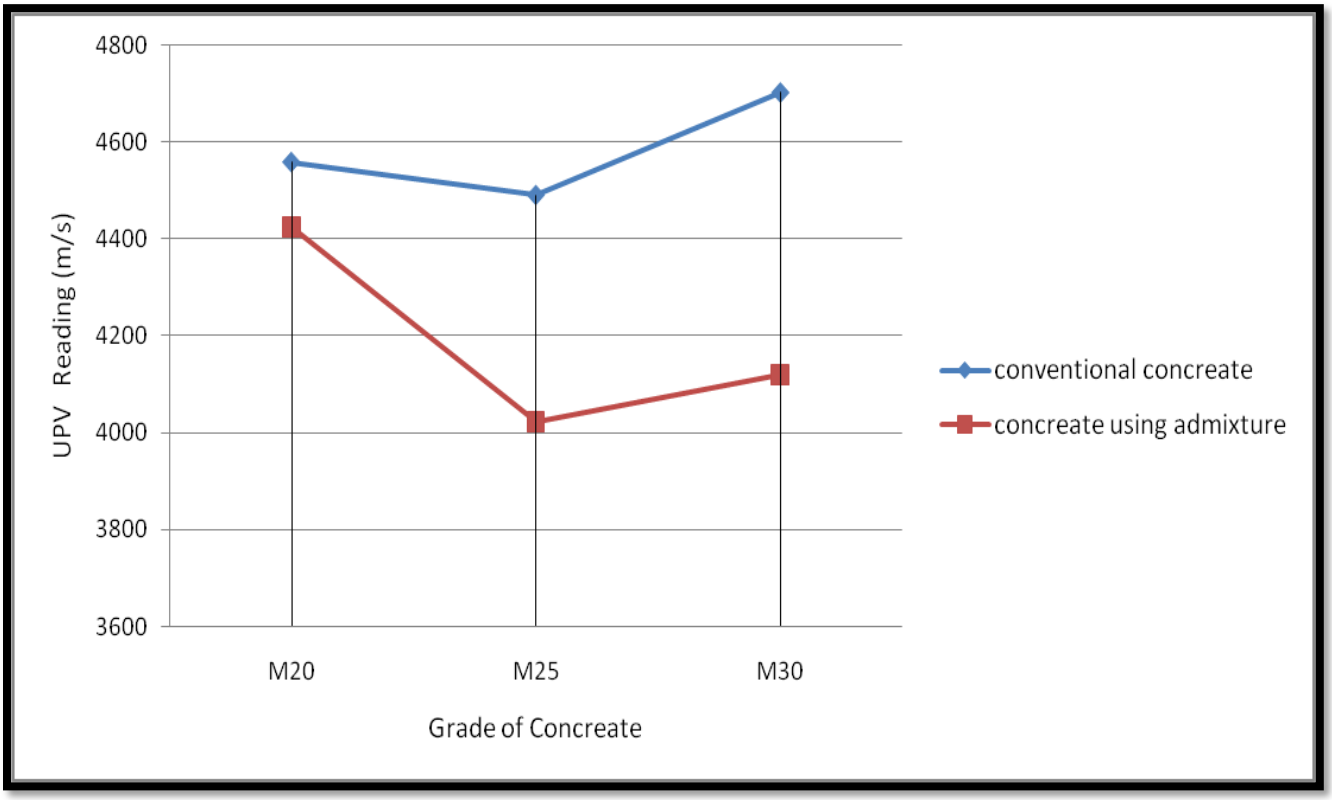
28 days ultrasonic pulse velocity μ=0.2 without curing



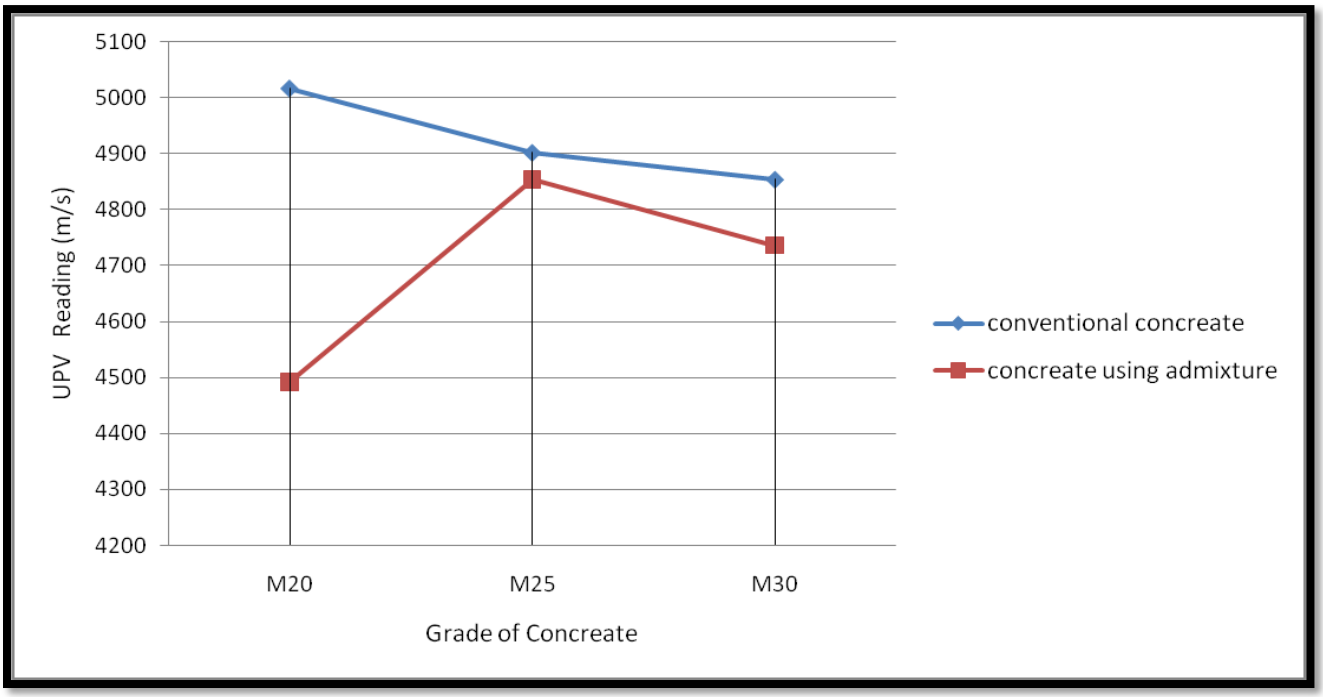
7 days ultrasonic pulse velocity μ=0.5 with curing



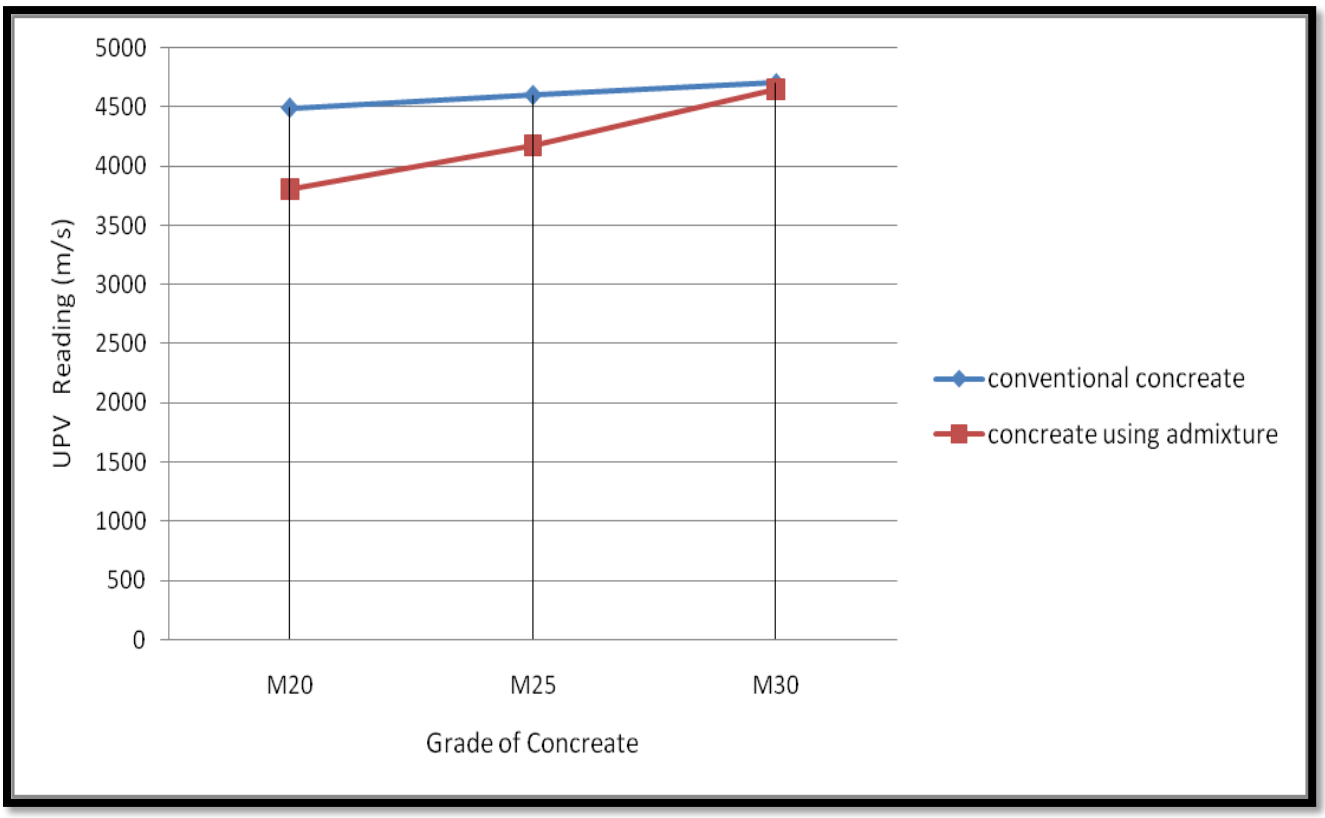
7 days ultrasonic pulse velocity μ=0.5 without curing



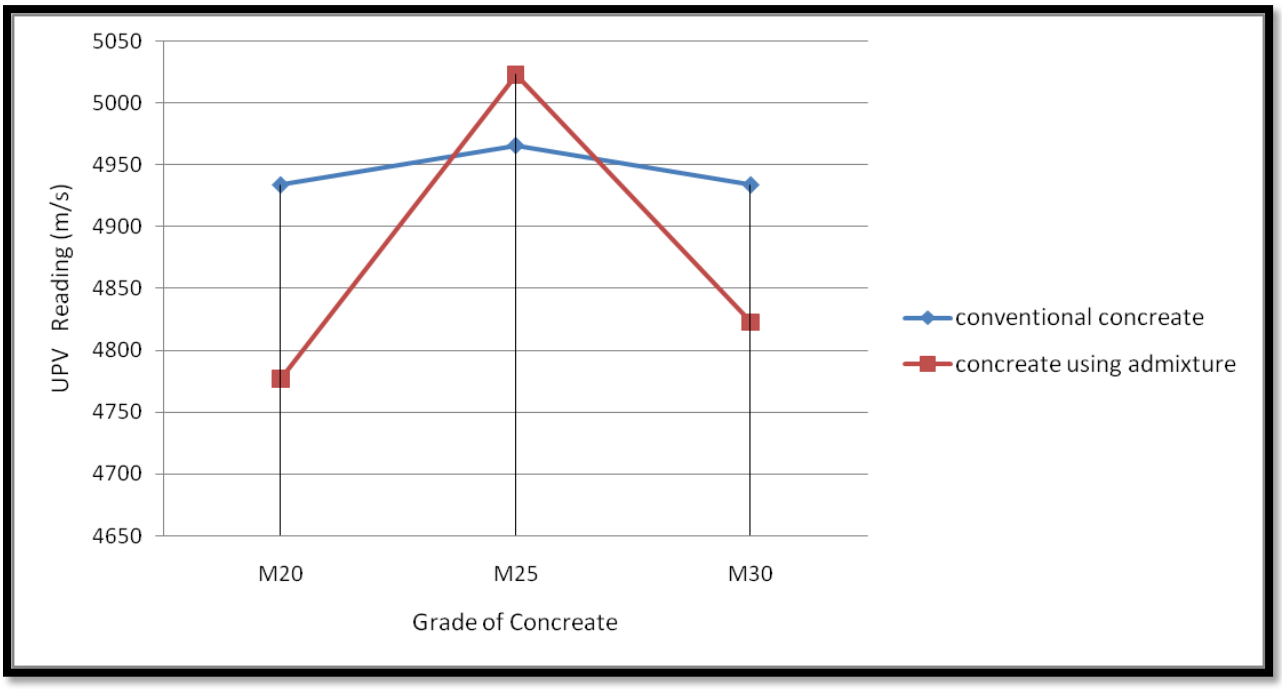
21days ultrasonic pulse velocity μ=0.5 with curing



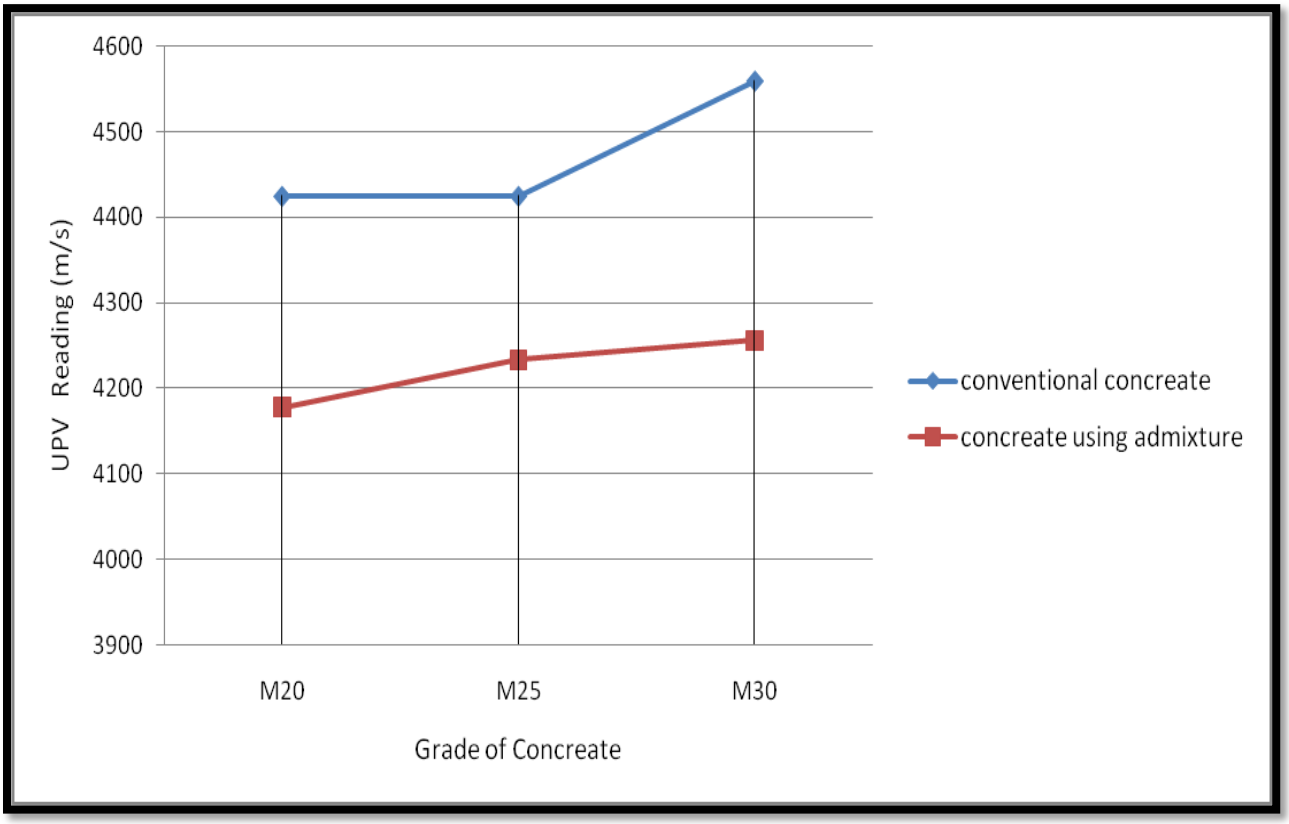
21days ultrasonic pulse velocity μ=0.5 without curing



28days ultrasonic pulse velocity μ=0.5 with curing



28days ultrasonic pulse velocity μ=0.5 without curing



Chapter 6
Conclusion

From the experimental study, we can derive the following conclusions:

1. The readings of UPV increases with age but the change is very small, reason behind
   it is that the density of the concrete remains same with the increase in age, so UPV
   alone cannot be used to find out the compressive strength.
2. From results, we firstly confirmed that there exists an exponential relationship between the compressive strength f_{ck} of the concrete cube and the longitudinal speed of propagation of ultrasound in them, v. The equations obtained from exponential regression for all grades of concrete can be used to determine the concrete strengths of the concrete mix proportions.

3. This study proposed a useful mathematical linear relationship that helps the researchers to anticipate confidently the compressive strength of standard concrete cubes, by measuring the ultrasonic pulse velocity with ultrasonic pulse velocity test. The mathematical expression is applicable for a wide range of normal concrete strengths.

4. Because of hardness of concrete increases with age, the readings of rebound hammer increases. We can directly determine the approximate value of compressive strength from the rebound number. But the compressive strength obtained from rebound hammer is less in case of M20 grade concrete and higher in M25 and M30 grades as compared to UPV strength after 28 days of curing.

5. Dependency on just NDT methods (Rebound Hammer Test or Ultrasonic Pulse Velocity Test) to calculate compressive strength of in-situ concrete wills not good results, so we have tested the cubes in CTM to increase the accuracy. And it results that the CTM strength is somewhat less in M20 but it is higher in M25 and M30 as compared with NDT tests at age of 28 days.

Chapter 7
References

[1] M. Colombo and R. Felicetti, “New NDT techniques for the assessment of fire-damaged concrete structures,” Fire Safety Journal, vol. 42, no. 6-7, pp. 461–472, 2007.

[2] B. Hobbs and M. Tchoketch Kebir, “Non-destructive testing techniques for the forensic engineering investigation of reinforced concrete buildings,” Forensic Science International, vol. 167, no. 2-3, pp. 167–172, 2007.

[3] K. L. Rens, T. J. Wipf, and F. W. Klaiber, “Review of nondestructive evaluation techniques of civil infrastructure,” Journal of Performance of Constructed Facilities, vol. 11, no. 4, pp. 152– 160, 1997.

[4] M. K. Lim and H. Cao, “Combining multiple NDT methods to improve testing effectiveness,” Construction and Building Materials, vol. 38, pp. 1310–1315, 2013.

[5] P. Shaw and A. Xu, “Assessment of the deterioration of concrete in NPP-causes, effects and investigation methods,” NDT.Net, vol. 3, no. 2, 1998.

[6] D. M. McCann and M. C. Forde, “Review of NDT methods in the assessment of concrete and masonry structures,” NDT and E International, vol. 34, no. 2, pp. 71–84, 2001.

[7] D. Breysse, G. Klysz, X. Derobert, C. Sirieix, and J. F. Lataste, ´ “How to combine several non-destructive techniques for a better assessment of concrete structures,” Cement and Concrete Research, vol. 38, no. 6, pp. 783–793, 2008.

[8]Akashi, T., & Amasaki, S. (1984). Study of the Stress Waves in the Plunger of a Rebound Hammer at the Time of Impact. Detroit: American Concrete Insitute.

[9]Bickley, J. (1982). The Variability of Pullout– Tests and In-Place Concrete Strength. Concrete International, ACI, Vol.4, No. 4 , 44-51.

[10] CONCRETO: Ensino, Pesquisa e Realizações. Organização: G. C. Isaia. São Paulo: IBRACON, 2005. pp 1109.

[11] COMITÉ EURO-INTERNATIONAL DU BÉTON. CEB-FIP Model Code 1990. London: Thomas Telford, 1993.

[12] ASNT, “Introduction to Nondestructive Testing”. The American Society for Nondestructive Testing. http://www.asnt.org/, 2006.

Appendix



Moulds are filled with concreate

During making of concrreate

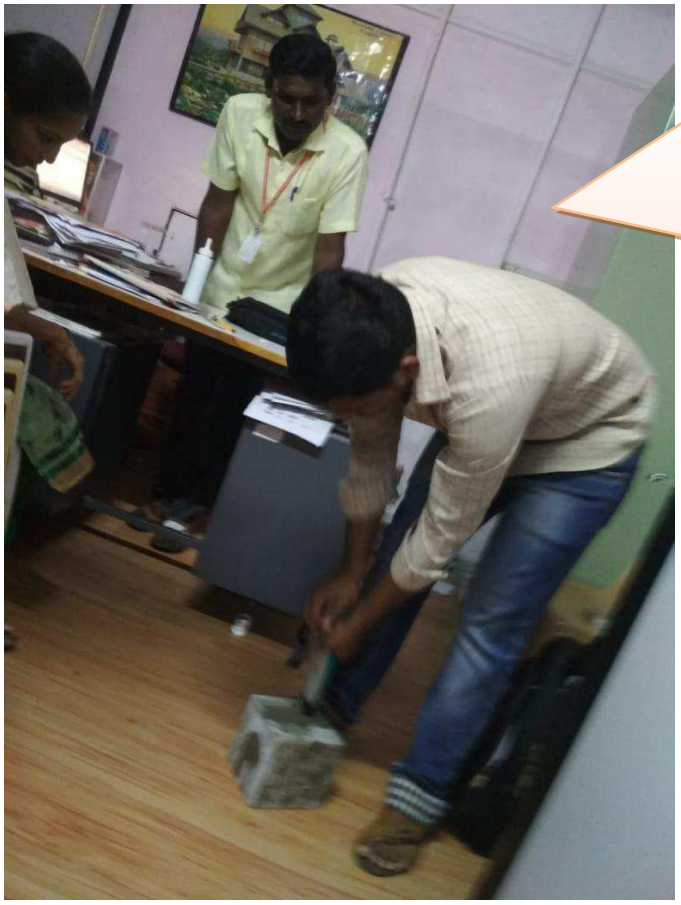




Providing vibrations to the concreate

Compression testing machine





Using rebound hammer test

Rebound hammer reading





Using ultrasonic pulse velocity test

Curing of blocks



Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Electrical Engineering Programme Code: 1-3675277161			
Year of offering: 2019-2020			
Sr. No.	Name of the Course that include experiential learning through project work/field work/internship	Course code	Number of the student studied course on experiential learning through project work/field work/internship
1.	Power System-I		41

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Electrical Engineering Department

Industrial Visit Record

Subject:- Power System-I

Class: S.Y.B.Tech.

A.Y.: 2019-2020

SHRI VITHAL EDUCATION & RESEARCH INSTITUTE's
COLLEGE OF ENGINEERING, PANDHARPUR
B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to P.A.H.Solapur University, Solapur)
NBAAccredited all Eligible UG Programmes and , **NAAC**, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, PuneISO 9001-2015 Certified Institute

REPORT

The Department of Electrical Engineering arranged Industrial Visit at **Gas Power Palnt, Uran** on **22nd September to 23rd September 2019**.The moto behind this industrial visit was that , the students should get the detailed practical knowledge of working of power plant with real time practical approach.Student understood the working of each and every part related to the Gas power plant.The economic aspects related to the power plant were also analyzed by the students. Total 41 students of S.Y.B.Tech Electrical participated were present for the Industrial Visit. The faculty members from Electrical department worked actively for the successful completion of Industrial Visit.The outcome for this visit are:

1) Student understood the operation of gas power plant.

HoD
Electrical

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Pandharpur- 413 304, District: Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757,Toll Free No.: 1800-3000-4131, E-mail: coe@sveri.ac.in,Web: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and Affiliatedto P.A.H.Solapur University, Solapur)
NBAAccredited all eligible UG Programmes, **NAAC**Accredited Institute,Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001-2015 Certified Institute

Department of Electrical Engineering
Name of the Students for Industrial Visit at "Gas Power Plant, Uran"
Date: 22nd September to 23rd September 2019

Sr No.	Name of Student	Sr No.	Name of Student
01	/BHONDAVE SNEHAL NARAYAN	33	LONDHE SHANTANU YASHWANT
02	BHOSALE NEHA SUKHADEV	34	MULE SAURABH DATTATRAY
03	DHOLE VAISHNAVI RAMESHWAR	35	MUNGUSKAR VAIBHAV POPAT
04	EKATPURE GAYATRI RAJENDRA	36	NARKAR MANGESH HARIBHAU
05	HOMKAR POONAM HANUMANT	37	NIKAM SHRISHAIL RAVSAHEB
06	/KALE SAKSHI DHANANJAY	38	PATIL SHANTANU RANGANATH
07	/LAVATE PRATIKSHA SHIVAJI	39	SURAVASE SHIVAJI BHIVAJI
08	/MAHARNAVAR SHIVANI BALASO	40	MANE KAIVALYA KAKASAHEB
09	/MANE SANSKRUTI SAINATH	41	SHINDE AKASH DATTATRAY
10	/METAKARI SONAL LAHU		
11	/NANAVARE AMRUTA SURESH		
12	/NAVALE PRATIDNYA RAJU		
13	/ROKADE KIRAN SOPAN		
14	/RUPNAR ANUSHKA MACCHINDRA		
15	/SALGARE PAYAL RAOSAHEB		
16	/SAWANT KISHORI SANTOSH		
17	/SURVE SAKSHI BALASAHEB		
18	BORATE ADITYA DHANAJI		
19	DOSHI SHUBHAM TARKESHWAR		
20	GAVHANE CHETAN SURESH		
21	GHADGE NARAYAN INDRAJIT		
22	GHATULE NIRANJAN BALASAHEB		
23	GAHIRWAR KUNDANSING		
24	HOWAL CHAITANYA DAYANAND		
25	INGALE VISHAL ANNASO		
26	JADHAV RUSHIKESH RAJENDRA		
27	KAMBLE ABHIJIT ARVIND		
28	KECHE AKSHAY BHAGAVAT		
29	KOKANE SAMEER SAMBHAJI		
30	KUMAR SURESH KRISHAN		
31	LADE TUSHAR HARIDAS		
32	LAMKANE KIRAN EKNATH		

HOD
Electrical Engineering

Industrial Visit At “Gas Power Plant, Uran ”





Visit: **Industrial Visit**

Date: **DEPARTMENT OF ELECTRICAL ENGINEERING**

Date - 22-9-19
Time - 11.00 pm

CLASS: S. Y. B Tech ELECT

Sr.NO	Name of Student	Sign
1	~~/AMBULE SHRADDHA ARJUN~~	NOT CAME
2	/BHONDAVE SNEHAL NARAYAN	
3	/BHOSALE NEHA SUKHADEV	
4	/DHOLE VAISHNAVI RAMESHWAR	
5	/EKATPURE GAYATRI RAJENDRA	
6	/HOMKAR POONAM HANUMANT	
7	/KALE SAKSHI DHANANJAY	
8	/MAHARNAVAR SHIVANI BALASO	
9	/MANE SANSKRUTI SAINATH	
10	/METAKARI SONAL LAHU	
11	/NANAVARE AMRUTA SURESH	
12	/NAVALE PRATIDNYA RAJU	
13	/RUPNAR ANUSHKA MACCHINDRA	
14	ROKADE KIRAN SOPAN	
15	/SALGARE PAYAL RAOSAHEB	
16	/Sawat Kishori S	
17	~~/Lavate Sneehal~~	
18	/SURVE SAKSHI BALASAHEB	
19	BORATE ADITYA DHANAJI	
20	DOSHI SHUBHAM TARKESHWAR	
21	GAHIRWAR KUNDANSING KIRANSING	
22	GAVHANE CHETAN SURESH	
23	GHADGE NARAYAN INDRAJIT	
24	GHATULE NIRANJAN BALASAHEB	
25	HOWAL CHAITANYA DAYANAND	
26	~~JUMBE DIPAK JAMBUVANT~~	
27	INGALE VISHAL ANNASO	
28	JADHAV RUSHIKESH RAJENDRA	
29	KAMBLE ABHIJIT ARVIND	
30	KECHE AKSHAY BHAGAVAT	
31	KOKANE SAMEER SAMBHAJI	
32	KUMAR SURESH KRISHAN	
33	LADE TUSHAR HARIDAS	
34	LAMKANE KIRAN EKNATH	
35	LONDHE SHANTANU YASHWANT	
36	MANE KAIVALYA KAKASAHEB	
37	MULE SAURABH DATTATRAY	
38	MUNGUSKAR VAIBHAV POPAT	
39	NARKAR MANGESH HARIBHAU	
40	NIKAM SHRISHAIL RAVSAHEB	
41	PATIL SHANTANU RANGANATH	
42	SHINDE AKASH DATTATRAY	
43	SURAVASE SHIVAJI BHIVAJI	

1	Prof S C Ukirade
2	Prof S K Akireddi
3	Prof Anitha Chirra

44. Lavate Pratiksha Shivaji

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Industrial Visit
Visit: gas Power Plant, Uran
DEPARTMENT OF ELECTRICAL ENGINEERING

Date - 23-9-19
Time - 2.30 pm

CLASS: S. Y. B Tech ELECT

Sr.NO	Name of Student	
1	~~/AMBULE SHRADDHA ARJUN~~	
2	/BHONDAVE SNEHAL NARAYAN	Sbhondave.
3	/BHOSALE NEHA SUKHADEV	Neha
4	/DHOLE VAISHNAVI RAMESHWAR	
5	/EKATPURE GAYATRI RAJENDRA	
6	/HOMKAR POONAM HANUMANT	Homkar
7	/KALE SAKSHI DHANANJAY	
8	/MAHARNAVAR SHIVANI BALASO	
9	/MANE SANSKRUTI SAINATH	
10	/METAKARI SONAL LAHU	Sonkar.
11	/NANAVARE AMRUTA SURESH	
12	/NAVALE PRATIDNYA RAJU	
13	/RUPNAR ANUSHKA MACCHINDRA	Anushka
14	ROKADE KIRAN SOPAN	
15	/SALGARE PAYAL RAOSAHEB	Salgare PR
16	/Sawat Kishori S	K.S.Sawant
17	~~/Lavate Sneahal~~	
18	/SURVE SAKSHI BALASAHEB	
19	BORATE ADITYA DHANAJI	Borate
20	DOSHI SHUBHAM TARKESHWAR	S.T.Doshi
21	GAHIRWAR KUNDANSING KIRANSING	
22	GAVHANE CHETAN SURESH	
23	GHADGE NARAYAN INDRAJIT	
24	GHATULE NIRANJAN BALASAHEB	
25	HOWAL CHAITANYA DAYANAND	
26	~~HUMBE DIPAK RAMCHANDRA~~	
27	INGALE VISHAL ANNASO	
28	JADHAV RUSHIKESH RAJENDRA	
29	KAMBLE ABHIJIT ARVIND	
30	KECHE AKSHAY BHAGAVAT	
31	KOKANE SAMEER SAMBHAJI	
32	KUMAR SURESH KRISHAN	
33	LADE TUSHAR HARIDAS	
34	LAMKANE KIRAN EKNATH	
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38	MUNGUSKAR VAIBHAV POPAT	
39	NARKAR MANGESH HARIBHAU	
40	NIKAM SHRISHAIL RAVSAHEB	
41	PATIL SHANTANU RANGANATH	
42	SHINDE AKASH DATTATRAY	
43	SURAVASE SIIIVAJI BHIVAJI	

1	Prof S C Ukirade	Ukiratex
2	Prof S K Akireddi	
3	Prof Anitha Chirra	

44. Lavate Sneahal shivaji

C.C

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRICAL ENGINEERING

Name of the Course: S.Y. B.Tech

(Syllabus to be implemented from w.e.f. June 2019)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S. Y. B. Tech. Electrical Engineering Semester-I
POWER SYSTEM-I

Teaching Scheme	Examination Scheme
Theory: - 3 Hrs/Week,1 Credits	**ESE** – 70 Marks
Tutorial: - 1 Hrs/Week, 1 Credit	**ICA-**25Marks
	ISE- 30Marks

This course introduces power plant which deals with generation of electrical energy The course also introduces economic aspects of different power plants

Course Prerequisite:

Knowledge of Basic Electrical Engineering, simple mathematical calculations Student shall have knowledge of energy conversion Student shall also have basic knowledge types of energy sources

Course Objectives:

- To develop conceptual understanding of operation of different power plants
- To learn economic aspects of power system.
- To study necessity and types of non-conventional energy sources
- To make students understand overhead structure of power system.

Course Outcomes:

After successful completion of this course,

- Student will be able to understand operation of different power plants
- Student will be able to analyze economic aspects of power system
- Student will be able to investigate need and areas of application for non-conventional energy sources
- Students will be able to understand overhead structure of power system.

SECTION-I

Unit 1 Economic Aspects of Power Generation **No of lectures-08**

- **Prerequisite:**
  Knowledge of Basic Electrical Engineering, simple mathematical calculations

- **Objectives:**
  - To introduce to student basic terms used in power system operation
  - To make student understand load curve
  - To introduce student to types of loads
  - To familiarize the students with the tariff methods for electrical energy consumptions

- **Outcomes:**
  After completing this unit, students –
  - Can define different terms in power system operation
  - Can analyze selection of generating units
  - Can calculate usage of electrical power & tariff

- **Unit Content:**
  Review of terms commonly used in system operations, Variable load on power station, Peak load, Base load, Diversity factor, Plant utility factor, Maximum demand, Load curves, load duration curves, Types of loads, Selection of generation units, Interconnected grid systems, Cost of electrical energy, Tariff & different types of tariff

- **Content Delivery Methods:**
  Chalk and talk, power point presentation

- **Assessment Methods:**
  Numerical problems related to cost of electrical energy and tariff, Theory questions related to above content

Unit 2 Base Load Power Plants **No of lectures-08**

- **Prerequisite:**
  Energy sources, Energy conversion methods

- **Objectives:**
  - Revision of Energy Sources.
  - To introduce student to different Conventional & non-Conventional Energy sources.
  - To make student understand different base load power plants.

- **Outcomes:**
  After completing this unit, students -
  - Can define conventional & non-conventional sources
  - Can compare different base load power plants

- **Unit Content:**
  Different types of conventional and non-conventional energy sources, Structure of power industry,
  Hydro Power Plant: Typical layout, Site selection, Classification, Hydrograph, Flow duration curves, Hydrology, Types of turbines.
  Thermal Power Plant: Typical layout, Site selection, Fuels & their handling, Combustion process, Ash handling, Dust collection.
  Nuclear Power Plant: Typical layout, Site selection, Nuclear reaction, Classification of nuclear reactor (AGR,PWR,BWR), Nuclear waste disposal, Environmental Aspects

- **Content Delivery Methods:**
  Chalk and talk, Power point presentations on Energy Sources

- **Assessment Methods:**

Theory questions related to above content.

Unit 3 Peak Load Power Plants **No of lectures-5**

- **Prerequisite:**
  Knowledge of Basic Electrical Engineering & nuclear reaction
- **Objectives:**

  1) To introduce student to Diesel & Gas Turbine Power Plants
  2) To introduce student to solar & Wind Power Plants
  3) To make student analyze typical layout of solar & Wind Power Plants

  Outcomes:
  After completing this unit, students –
  1. Can apply the operation of Diesel & Gas Turbine Power Plants
  2. Can apply the operation of solar & Wind Power Plants
- **Unit Content:**
  Review of Diesel Plants (advantages & disadvantages), Typical layout of power plant, site selection, Review of Gas Turbine Plants (advantages & disadvantages), Typical layout of power plant, Site selection, Review of Solar Energy (advantages & disadvantages), Typical layout of solar thermal power plant, Site selection, Review of wind energy (advantages & disadvantages), Typical layout of wind power plant, Site selection
- **Content Delivery Methods:**
  Chalk and talk, power point presentation
- **Assessment Methods:**
  Theory questions related to above content

SECTION II

Unit 4– General structure of power system **No of lectures – 08**

- **Prerequisite:**
  DC system, single phase & three phase systems, ohms law
- **Objectives:**
  1. To learn basic structure of power systems
  2. To make student understand different transmission systems
- **Outcomes:**
  After completing this unit, students -
  1. Can distinguish between different supply systems
  2. Can compare between AC and DC transmission System.
  3. Can compare between overhead and underground System.

Unit Content:
Review of Electrical supply system, typical AC power supply scheme, Comparison DC and AC systems, comparison between overhead and underground system

- **Content Delivery Methods:**

Chalk and talk, power point presentations

- **Assessment Methods:**
  Theory questions related to above content

Unit 5– Economic Aspects of Transmission System **No of lectures – 08**

- **Prerequisite:**
  DC system, single phase & three phase systems, ohms law

- **Objectives:**
  1) To make student understand conductor cost of different AC transmission systems
  2) To make student understand Economics of power transmission

- **Outcomes:**
  After completing this unit, students -
  1) Can calculate voltage, conductor cost for various transmission systems
  2) Can calculate Economic conductor size for given transmission system (Kelvin's law)

- **Unit Content:**
  Comparison of conductor cost for various Overhead AC transmission systems, comparison of conductor cost for various Underground AC transmission systems, Economic choice of conductor size by kelvins law

- **Content Delivery Methods:**
  Chalk and talk, power point presentations

- **Assessment Methods:**

  Numerical problems and derivation related to conductor cost for different transmission systems and Kelvin's law Theory questions related to above content

Unit 6– Mechanical design of overhead lines **No of lectures – 05**

- **Prerequisites:**
  Electrical Material**s** & their properties**,** Capacitance

- **Objectives:**
  1. To introduce concept of overhead transmission line
  2. To introduce different conducting material & their application
  3. To introduce different insulators & their application
  4. To make student understand string efficiency & methods to improve it

- **Outcomes:**
  After completing this unit, students -
  1. Can describe construction and use of different insulators, conductor, line supports
  2. Can calculate string efficiency of given string insulators

- **Unit Content:**
  Review of overhead transmission line, main components, conductor materials, line supports, overhead line insulators, types- pin type, suspension type, strain type insulators, string efficiency, methods of improving string efficiency

- **Content Delivery Methods:**

Chalk and talk, power point presentations, videos lectures on insulators, line supports

- **Assessment Methods:**
  Numerical problems and derivation related to string efficiency, Theory questions related to above content

- **Internal Continuous Assessment (ICA) :**
  ICA shall consist of Minimum **FOUR** drawing Sheetson above syllabus and **report on visit** to any one of the generating power plant

- **Text Books:**

1) "A course in Electrical Power", S K Kataria & Sons, J B Gupta

2) "Generation of Electrical Energy", S Chand Publication, B R Gupta

3) "Power System Engineering", Laxmi Publications, R K Rajput

4) "Power Plant Engineering", New Age International Publication, A K Raja

- **Reference Books:**
  1) " Power Plant Technology", Tata Mc Graw Hill,MMEI-Wakil
  2) "Power Plant Engineering", S Chand Publications, Samsher Gautam

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No 54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: Master of Business Administration (MBA) Programme Code: 1-1408968337			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Project Report & Viva		52

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PANDHARPUR

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SVERI's
College of Engineering, Pandharpur

Master of Business Administration
(MBA) Department

Project Report & Viva Record

A.Y.: 2019-2020

SVERI's College of Engineering, Pandharpur

Master of Business Administration

A.Y.:- 2019-2020

List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
1.	Jade Nishigandha Ambadas	A Study On Buying Behavior And Customer Satisfaction Of Yamaha Bikes With Special Reference To Shree Motors Yamaha Pandharpur .	Prof. P.S. More
2.	Chikane Jyotsna Jitendra	A Study On Non-Performing Assets With Special Reference To The Pandharpur Merchant Co-Operative Bank Ltd , Pandharpur.	Prof . P. S. More
3.	Chavan Neha Mahesh	A Study On Employee Satisfaction With Regard To Recruitment And Selection With Specific Reference To Ssv Engineers Pvt. Ltd. Pune.	Prof. A.N.Gaikwad
4.	Kakade Dhanshree Vishwanath	A Study On Stress Management Of Employee With Special Reference To Mota Garment Pvt. Ltd., Baramati.	Prof. K. B. Patil
5.	Shinde Prajakta Chandrakant	A Study On HR Policies And Practices With Special Reference To Mota Garment Baramati.	Prof. K. B. Patil

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
6.	Limgire Prajakta Mohan	A Study On Customer Satisfaction Towards Hotel Industry With Special Reference To Radish Garden At Pandharpur	Prof.S.A.Jagtap
7.	Shewale Pradnya Vasant	A Study On Employee Performance Appraisal With Special Reference To Kb Plus Software System Pvt. Ltd. Katraj, Pune	Prof. A.N.Gaikwad
8.	Bhosale Prajakta Jayawant	A Study On Customer Satisfaction With Special Reference To Jay Plast Pack Pvt. Ltd, Pune.	Prof. K. B. Patil
9.	Hivrale Rohan Hanumant	Effective Training And Development	Prof.K.B.Patil
10.	Shinde Shital Deepak	A Study On Customer Satisfaction Of Product And Service With Special Reference To The Pandharpur Merchant Cooperative Bank Ltd. Pandharpur	Prof. P.S. More

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

SVERI's College of Engineering, Pandharpur

Master of Business Administration

A.Y.:- 2019-2020

List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
11.	Jadhav Rahul Dashrath	A Study On Customer Satisfaction Towards Bajaj Bikes With Reference Pawar Bajaj Showroom At Atpadi	Prof. P.S. More
12.	More Apurva Vikas	A Study On Employee Relationship Management And It Seefect On Employee Reference At Ssp Technology	Prof.K.B.Patil
13.	Takale Varsha Somnath	A Study On The Effect Of Stress On Employee Performance With Special Reference Utl. Coupling Pvt. Ltd. Satara.	Prof.K. B.Patil
14.	Hake Dilip Gorakh	A Study On Payroll Software Used In Vishwkarma Enterprises And HR Role In Payroll	Prof. A.N.Gaikwad
15.	Sawant Vaibhav Babasaheb	A Study On Recruitment And Selection With Special Reference To Real Life Care Drugs Pvt Ltd	Prof. S. A. Jagtap.

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
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SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
16.	Yadav Vaibhav Bharat	A Study On General Awareness About Health Insurance And Customer Satisfaction With Special Reference To Iffco-Tokio Insurance Company Pvt Ltd	Prof. S. A. Jagtap.
17.	Lavate Akshay Bhiva	A Study On Recruitment And Selection With Special Reference To Raj Industry Pune	Prof. K. B. Patil
18.	Ropalkar Swapnil Balkrishna	A Study On Cost Analysis With Special Reference To Shetkari Sahkari Soot Girani Maryadit Sangole	Prof. R. N. Misal
19.	Dongare Vishal Vilas	A Study On Training And Development At Micro Dynamic Software Company Pune	Prof. K. B. Patil

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
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SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
20.	Dongare Sangram Ranjit	A Study On Customer Perception Towards Mahindra Tractors Authorized Service Center With Special Reference To Vitthal Automotive	Prof M.M Bhore
21.	Shaikh Sahil Jamil	A Study On Work Life Balance Of Employees With G4s Facility Services (I) Pvt. Ltd., Pune.	Prof. R. N. Misal
22.	Gaikwad Rupali Prakash	A Study On Employees Performance Appraisal In Sugar Factory With Special Reference To Shri Sant Damaji Sahakari Sakhar Karkhana Ltd, Mangalwedha.	Prof. K.B. Patil.
23.	Mane Ashwini Sambhaji	A Study On Customer Satisfaction And Exception With Regard To Real Estate For Pgd Pinnacle Llp	Prof M.M. Bhore
24.	Randive Vikram Vinayak	A Study On Comparative Analysis Of Bank In Terms Of Services Quality With Special Reference Canare Bank Pandharpur	Prof M.M. Bhore
25.	Inamdar Mujjmeel Jahangir	A Study On Customer Perception Towards Digital Marketing With Special Reference To Kbplus	Prof M. M .Bhore

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
26.	Suryawanshi Pooja Shivaji	A Study On Wages And Salary Administration Special Reference To Utkarsh Transmition Pvt Ltd Satara	Prof. A. N. Gaikwad
27.	Pakhare Sarjerao Balbhim	A Study On Employee Job Satisfaction Of Vitthal Corporation Ltd Mhaisgaon (Sugar Industry)	Prof. K. B. Patil
28.	Nanaware Prashant Balu	A Study On Awareness Of Integrated Facility Management Services And Willingness To Consider Availing Such Services With Respect To G4s Facility Services (India) Ltd	Prof M.M Bhore
29.	Jeva Khatoon	A Study On Job Satisfaction Of Employees With Surjeet Hyundai,27-G Near Minal Jk Road, Bhopal(Mp).	Prof.K. B. Patil
30.	Devkar Minakshi Dattatray	A Study On Satisfaction About Employee Compensation With Reference To The S.S.V Engineers Pvt Ltd Pune	Prof.A.N. Gaikwad
31.	Doshi Nikita Harshvardhan	A Study Of The Non-Performing Assets Of The Pandharpur Urban Co-Operative Bank Ltd	Prof. S. A. Jagtap

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
32.	Khune Rupali Anand	A Study On Wages And Salary Administration With Reference To Sumeet Facilities Pvt. Ltd, Chinchwad Pune.	Prof. S. A. Jagtap.
33.	Jamdar Puja Mahadeo	A Study On Perception Of Consumer With Respect To Highfat Milk And Lowfat Milk For Kolhapur Zillha Sahkari Dudh Utpadak Sangh Ltd (Gokul) Kolhapur	Prof.K. B. Patil
34.	Shah Sejal Rajkumar	Shah Sejal Rajkumar	Shah Sejal Rajkumar
35.	Giram Suraj Satish	A Study On Perception Of Customer Towards Advertising And Sales Promotion Of Sterling Motors For Tata Motors Showroom	Prof. A.N. Gaikwad
36.	Behere Vidyarani Rajaram	A Study on evaluation of Training Program	Prof. A. N. Gaikwad
37.	Yelpale Monali Ashok	To Study On The Employee Welfare In The Tejas Agro Irrigation System Pvt Ltd Bhandishegaon.	Prof. K. B. Patil

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
38.	Sartape Akshasy Tanaji	A Study On Supply Chain Management With The Help Of Babasaheb Deshmukh Shetakri Sahakari Soot Girni Maryadit, Atapdi	Prof. P. S. More
39.	More Manisha Sahebrao	A Study On Recovery Management Crenta Chemical Tembhurni	Prof. R. N. Misal
40.	Khandelwal Sakshi Vishnukant	A Study On Employee Motivation With Special Reference To Nikho Engineers Pvt Ltd Pune	Prof. A. N. Gaikwad
41.	Inamdar Pranjali Sayaji	A Study On Employee Retention In Cipla Ltd At Kurkumbh	Prof. K. B. Patil
42.	Vyavahare Swapnil Satyawan	A Study On Customer Satisfaction Towards Bafna Tata Pvt. Ltd. Pune	Prof. A. N. Gaikwad

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

SVERI's College of Engineering, Pandharpur

Master of Business Administration

A.Y.:- 2019-2020

List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
43.	Khare Vishal Gahininath	A Study On Internet Banking Facility Awareness Among The Sbi Bank Account Holder In Sbi Karkamb Branch	Prof. P.S. More
44.	Satpute Chetan Arjun	A Study On Rural Customer Behavior Of Purchasing Tafe Tractor Authorized Service Center With Special Reference To Sonali Tractor	Prof. P.S. More
45.	Bangale Pooja Raghunath	A Study On Loans And Advance Its Procedure With Special Reference Union Bank Of India Pandharpur.	Prof. P.S. More
46.	Masal Chandrakant Appa	A Study On Market Potential For The Milk And Milk Product With Reference To Szsdv And Ps's Dudh Pandhari Branch Pandharpur	Prof. P.S. More
47.	Kamble Swapnil Surykant	A Study On Financial Analysis Of Nestle India Pvt Ltd Mumbai	Prof. P.S. More
48.	Abhijeet Suresh Tarate	Study of Recruitment and Selection Process in Real Dairy Industries	Prof. A. N. Gaikwad
49.	Aditya Dhanajya Gaikwad	A study on Customer Satisfaction towards Honda bike with special reference to Sangram Wheels Pvt Ltd.	Prof. K. B. Patil

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur.

SVERI's College of Engineering, Pandharpur
Master of Business Administration
A.Y.:- 2019-2020
List of Students Studied the Course "Project Report & Viva"

Sr. No.	Student Name	Project Title	Guide Name
50.	Dhondore Vijay Sanjay	A Study of Babasheb Deshmukh Shetkari Sahakari Soot Girni Maryadit Ltd. Atpadi	Prof. A. N. Gaikwad
51.	Hingamire Revti Milind	A Study On Employee Welfare Facility In Dairy Industry With Special Reference To Kolhapur Zillha Sahkari Dush Utpadak Sangh Ltd Gokul Kolhapur	Prof. K. B. Patil
52.	Chavan Suraj Yashwant	A Study On Awareness Of Health Insurance Products In Pandharpur Area And Claim Settlement Process With Reference To The United India Insurance Company .	Miss. M.M.Bhore

(Prof. Karan Patil)
Head, MBA Dept.

H. O. D.
Master of Business Administration
C. O. E. Pandharpur

YAMAHA

श्री मोटर्स

(अधिकृत यमाहा डिलर सेल्स अॅण्ड सर्व्हिस)

दिनांक : 15/07 / २०१९

CERTIFICATE

This is to certify that **Miss. Nishigandha Ambadas Jade** a student of SVERI's College of Engineering, Pandharpur, Dist. Solapur, has worked in our organization from 5 June 2019 to 5 July 2019 on a project assigned by us. She has worked on the project named as **"A STUDY ON CUSTOMER BUYING BEHAVUOR AND CUSTOMER SATISFACTION OF YAMAHA BIKES WITH SPECIAL REFERANCE TO SHREE MOTORS YAMAHA, PANDHARPUR."** She has successfully completed her summer internship at **SHREE MOTORS YAMAHA** Pandharpur. During the period of her project she was participated in all activities of our showroom.

During the tenure of the project we found her hard working & sincere and we wish her all the very best in her future endeavors.

SHREE MOTORS 191.30 PANDHARPUR

Owner

Mr. Shreeomkar Suryavanshi.

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t.- 1961
(02186)◆H.O. 223106 Manager : Tele Fax : (02186) 227682
ne Pandharpur Merchant's
o-op. Bank Ltd;
kmi Path,PANDHARPUR 413304
Email Id. - pmcblppr@rediffmail.com
दि पंढरपूर मर्चन्टस्
को-ऑपरेटिव्ह बँक लिमिटेड
लक्ष्मी पथ, पंढरपूर ४१३३०४
nches- ▸ Karkamb 242239 ▸ Market Yard,Pandharpur 223834 ▸ Kurduwadi 223163 ▸ Mahud 246376 ▸ Tembhurni 231612

Ref. No. :-

Date : 8 JUL 2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Ms. Chikane Jyotsna Jitendra** a student of ***Shri Vithal Education And Research Institute's College of Engineering, MBA Department Pandharpur,*** Dist- Solapur has worked in our organization on project assigned by us.

She has worked on the project named **" A Study of Non Performing Assets with special Reference to The Pandharpur Merchant's Co-op. Bank Ltd; Pandharpur"** She has successfully completed her Internship form 5th June 2019 to 5th July 2019 at The Pandharpur Merchant's Co-op. Bank Ltd; Pandharpur.

During the period of internship we found that she was sincere and hard working.

I wish her success for all her future endeavors.

The Pandharpur Merchant's Co-op Bank Ltd; Pandharpur

The Pandharpur Merchant's Co-op. Bank Ltd. 1951 Pandharpur

Mr.Sunil G. Mohite
Manger

Mr. Dnyaneshwar S. Pore
Guide-Recovery Officer

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SSV ENGINEERS PVT. LTD.

CIN No. : U29299PN2006PTC131611 2007-2008
AN ISO 9001:2008 , ISO 14001 : 2004 & OHSAS 18001:2007 CERTIFIED COMPANY
Registered Office- Unit I : E-110, General Block, M.I.D.C., Bhosari, Pune - 411 026.
Maharahtra, (India) Phone : +91-020-66353900 Fax : +91-020- 66353934

SSV\HRD

Date: July 11, 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Miss. NEHA MAHESH CHAVAN** a student of Shri Vithal Education And Research Institute's College Of Engineering, MBA Department, Pandharpur has Successfully completed her summer internship in our organization.

Her topic was "**A study on Recruitment & Selection" with reference to SSV ENGINEERS PVT. LTD in Pune.**

She has successfully completed her internship from 10th June 2019-10th July 2019.

During the period of internship we found that she was sincere & hardworking.

I wish all the best for her successful future.

HR Manager

FOR SSV ENGINEERS

mail : vmshinde@ssvpune.com www.ssvengineers.com

Unit II : Gat No. 214, 220, 221, Nanekarwadi, Chakan, Tal. Khed, Dist - Pune - 410 501.
Unit III : Plot No. C-9, Indapur Five Star Industrial Area, Loni Devkar, Tal. Indapur, Dist - Pune.

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mota uniforms

Look good, feel good

Date: 04/07/2019

INTERNSHIP CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Ms. Dhanshree Vishwanath Kakade** , is a student of MBA-II in SVERI's, COE Pandharpur, P.A.H. Solapur Univerisity,Solapur. She has successfully completed 1 month (5th June 2019 to 4th July 2019) internship programme at MOTA Garment Pvt.Ltd. She has worked on the project named "A Study on Stress Management of Employee with Reference to MOTA Garment Pvt.Ltd. Baramati."

During the period of her internship programme with us she was found punctual , hardworking and inquisitive.

We wish her every success in career & life.

For MOTA Garment Pvt. Ltd.

Authorized Signature

MOTA GARMENT

PARTNER

orate Office and Manufacturing Plant
a Garments Plot No. D 4, M I D C , Baramati 413 133 Dist. Pune, Maharashtra Tel. +91 2112 243 112/ 243 312 Email info@motagroup.in

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Date: 04/07/2019

mota uniforms
Look good, feel good.

INTERNSHIP CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Ms. Prajakta Chandrakant Shinde,** is a student of MBA-II in SVERI's, COE Pandharpur, P.A.H. Solapur Univerisity,Solapur. She has successfully completed 1 month (5th June 2019 to 4th July 2019) internship programme at MOTA Garment Pvt.Ltd. She has worked on the project named "A Study on HR Policies and Practices with Reference to MOTA Garment Pvt.Ltd. Baramati."

During the period of her internship programme with us she was found punctual , hardworking and inquisitive.

We wish her every success in career & life.

For MOTA Garment Pvt. Ltd.

Authorized Signature

MOTA GARMENT

PARTNER

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॥ श्री ॥

PURE VEG

राधेश गार्डन

के.बी.पी. कॉलेज चौक, पंढरपूर, जि. सोलापूर

प्रोप्रा. दोशी बंधू मो. ९७६३६३६४८४

TO WHOM SO EVER IT MAY CONCERN

This is to Certify that Miss. Prajakta Mohan Limgire a student of Shri Vitthal Education & Research Institutes College of Engineering, MBA Department, Pandharpur has successfully completed her summer internship in our organization her topic was " A Study on Customer Satisfaction Towards Hotel Industry With Special Reference to Hotel Radhesh Garden ."

She has successfully completed her internship from 05/06/2019 to 05/07/2019 at Radhesh Garden. During the period of her internship we found that she was sincere & hardworking. I wish her all the best for her successful future.

Rupesh Doshi

राधेश गार्डन

प्रोप्रायटर

Proprietor

केटरींगच्या सर्व ऑर्डर स्विकारल्या जातील..... हव्या तशा व हव्या तेथे

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KBPlus Software System Pvt. Ltd.
E-mail : kbplussoftwaresystem@gmail.com

Date: 08/07/2019

TO WHOMEVER IT MAY CONCERN

This is to certify that **Ms. PRADNYA VASANT SHEVALE** appearing at **SVERI'S COLLEGE OF ENGINEERING, PANDHARPUR Dist.**- Solapur for the course of **MBA**, Semester-III for academic year 2019-2020, and she is completed her Project Report entitled **"TO STUDY ON EMPLOYEE PERFORMANCE APPRAISAL"** in our organization from 8th June 2019 to 8th July 2019.

The work prepared by Ms. Pradnya Vasant Shevale in partial fulfillment for the award of the degree of Masters in Business Administration (MBA).

During the period of internship, she was found to be ambitious and hard working. Her commitment to learn and work gives lot of pleasure in issuing this certificate to her.

I wish her success for all future endeavors.

For KB Plus Software System Pvt.Ltd.

Mr. Abdul Malik.

Asst.Manager HR

08/07/2019.

KBPLUS SOFTWARE SYSTEM PVT. LTD

Flat No. 2, Sairaj Appartment Society, Anjani Nagar, Katraj, Pune - 411 046. Mob.: +91 - 9922833107

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JAY PLAST PACK PVT.LTD

MANUFACTURE OF H.D.P.E. P.P. LAMINATED OR UNLAMINATED WOVEN SACKS

DATE :- 8th July 2019

Certificate

Mrs. **Prajakta Jayawant Bhosale** Student of MBA Class From SVERI College of Engineering, Pandharpur was with us for implant training from 2nd June 2019 To 3rd July 2019 (30 Days) has completed her Summer Internship Project.

She has worked in the field of Marketing on the Title of "The Study of Customer Satisfaction" with special reference to JAY PLAST PACK PVT LTD.

During her project duration she worked sincerely.

For,

JAY PLAST PACK PVT LTD.

JAY PLAST PACK PVT LTD. PANDHARPUR

Factory Address: Gat no. 395, near Atlas Copco Company, At Post Lonikand, Tal- Haveli Dist Pune 412 216.
Contact us: *Web Site* - www.jayplastpack.com. *Phone*- +91 9860502525.
Email us: - info@jayplastpack.com ,sales@jayplastpack.com

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THE PRIDE HOTEL
PUNE

REF:-TPH/HR/2019

Date: 16th August, 2019

TO WHOM IT MAY CONCERN

This is to certify that **MR.ROHAN HANUMANT HIVARALE** of **SVERI's College of Engineering Pandharpur**. He has undergone **Indusrtial Training** with us in the **HR Department** from **1ST July, 2019 to 15th August, 2019.**

During the above period, we found him to be sincere, hardworking, willing and eager to learn.

We wish him all the best for his future career.

FOR THE PRIDE HOTEL, PUNE

PRIDE HOTELS LIMITED
5, UNIVERSITY ROAD, S'NAGAR
PUNE

LAXMIKANT D. JOSHI
HR MANAGER

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Est.- 1961 (02186)◆H.O. 223106 Manager : Tele Fax : (02186) 227682

The Pandharpur Merchant's
Co-op. Bank Ltd;
Laxmi Path,PANDHARPUR 413304
Email Id. - pmcblppr@rediffmail.com

दि पंढरपूर मर्चन्टस्
को-ऑपरेटिव्ह बँक लिमिटेड
लक्ष्मी पथ, पंढरपूर ४१३३०४

Branches- ▸ Karkamb 242239 ▸ Market Yard,Pandharpur 223834 ▸ Kurduwadi 223163 ▸ Mahud 246376 ▸ Tembhurni 231612

Ref. No. :- pmcb/116/2019/20 Date :- 5 JUL/2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Ms. Shinde Shital Deepak** a student of ***Shri Vithal Education And Research Institute's College of Engineering, MBA Department Pandharpur,*** Dist- Solapur has worked in our organization on project assigned by us.

She has worked on the project named " **A Study on Customer Satisfaction of Products and services with special Reference to The Pandharpur Merchant's Co-op. Bank Ltd; Pandharpur"** She has successfully completed her Internship form 5th June 2019 to 5th July 2019 at The Pandharpur Merchant's Co-op. Bank Ltd; Pandharpur.

During the period of internship we found that she was sincere and hard working.

I wish her success for all her future endeavors.

The Pandharpur Merchant's Co-op Bank Ltd; Pandharpur

The Pandharpur Merchant's Co-op. Bank Ltd. 1961 Pandharpur

Mr.Sunil G. Mohite
Manger

Mr. Dnyaneshwar S. Pore
Guide-Recovery Officer

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CERTIFICATE

Date- 21/08/2019

This is to certify that Mr. Rahul Dashrath Jadhav student of Master of Business Administration from SVERI's College Of Engineering pandharpur. as worked from

04 /June /2019 To 03/July 2019 in our organization. During This period,he successful completed the project work assign to him .

The Project undertaken During the period was **"A STUDY ON CUSTOMER SATISFACTION TOWARDS BAJAJ BIKES WITH REHRENCE,PAWAR BAJAJ SHOWROOM ATPADI ".**

He has been sincere Hard working and Punctual in this work .We wish him

best of luck for his career development.

OSV

Signature

Name Pawar

Designation Proprietors

Dealership Name : Pawar Auto

Regards

Pawar Bajaj

Atpadi

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SSP TECHNOLOGY PUNE

Office Address: 2nd Floor, Above Jijamata Bank , Near Karvenagar Bus Stop, Pune 33.
Mobile No: +91-9579670950 E-mail: info@ssptechnosys.com
Website: www.ssptechnosys.com

REF: Spon-SP0135-2019

Date: 09/07/2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Apurva Vikas More** student of **MBA (HR)** from **"Shri Vitthal Education and Research Institute, Pandharpur"** has successfully completed Internship on **"Employee Relationship Management and Its Effect on Employee Performance at SSP Technology"** as a partial fulfillment of requirement towards Second Year of MBA project.

University Name- Solapur University.

Duration- 08th June 2019 to 08th July 2019.

Branch- MBA (HR)

As abided by intellectual property and confidentiality policy of SSP Technology Pune.

We wish her every success in life.

SSP TECHNOLOGY

AUTHORIZED PERSON SIGN

SSP TECHNOLOGY PUNE

www.ssptechnosys.com

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FLEXIBLE COUPLINGS

Rof. No.- COEP/MBA/2019-20/04

Date -08.07.2019

TO WHOM-SO-EVER IT MAY CONCERN

This is to certify that **MISS. VARSHA SOMANATH TAKLE** MBA Student of "Shri Vithal Education & Research Institute's College of Engineering, Pandharpur" worked for summer Internship project entitled **"A STUDY ON THE EFFECT OF STRESS ON EMPLOYEE PERFORMANCE"** in our company from **8 June 2019 to 8 July 2019** with our entire satisfaction.

During his project period we found her a sincere, honest, hardworking, dedicated student with a professional attitude and very good job knowledge. She is amiable in nature and character is well. We wish her every success in life.

From

Utkarsh Transmission Pvt. Ltd.

DEPUETY GENERAL MANAGER (D.G.M.)

Date: 08.07.2019

UTKARSH TRANSMISSIONS PVT. LTD.
Reg. Office : 27, Kanga Colony, Sadar Bazaar, Satara - 415002
Factory Address :-M-15/2, Additional MIDC, Satara - 415004
Corporate Identity Number : -U25192MH1994PTC082990
Phone No : 02162-240574 / 240974, Fax No. : 02162 - 240174
Email : sales@utlcoupling.com, Website : www.utlcoupling.com

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Website: www.vishwakarma enterprises.in
E-mail: info@vishwakarma enterprises.in
Tel:020 27691388, Fax:020 7690307, Mob:9371018106

VE

VISHWAKARMA ENTERPRISES

Gat No.87/14, Tal: Haveli, Jyotiba Nagar, Talwade, Pune -412 114.

July 06,2019

TO WHOHEVER IT MAY CONCERN

This is to certify that **Mr. Hake Dilip Gorakh** From **Sveri's College Of Engineering, Pandharpur** at **Punyashlok Ahilyadevi Holkar Solapur University** for the course of **MBA** , semester-III for academic year 2019-2020 ,and he is completed his project Report entitled " **A study on payroll softwares used in vishwakarma enterprises and hr roll in payroll"** in our Organization from 6th June to 6th July 2019.

During the period of internship, he was found to be ambitious and hardworking; His commitment to learn and work gives lot of pleasure in issuing this certificate to his.

I wish his success for all future endeavors.

For Vishwakarma Enterprises

for Vishwakarma Enterprises

Authorized Signatory

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REAL LIFE CARE DRUGS PVT LTD PUNE

TO WHOM-SO-EVER IT MAY CONCERN

This is to certify that **Mr. VAIBHAV BABASAHEB SAWANT** MBA Student of "Shri Vitthal Education and Research Institutes College of Engineering Pandharpur" worked for summer internship project entitled **"A STUDY ON RECRUITMENT AND SELECTION WITH SPECIAL REFRENCE TO REAL LIFE CARE DRUGS PVT LTD PUNE"** in our compony from **8th June 2019 to 8th July 2019** with our entire satisfaction.

During his project period we found his a sincere, honest, hard working, dedicated student with a professional attitude and very good job knowledge. He is amiable in nature and character is well. We wish his every success in life.

From

REAL LIFE CARE DRUG PVT. LTD.

Managing Director

Date: 08/07/2019

Real Life Care Drugs Private Limited

Director

Real Life Care Drugs Private Limited's
(CIN) U74999PN2015PTC157693
registration number is 157693.
Email - santosharjunchavan@gmail.com

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Date:- 4th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Yadav Vaibhav Bharat** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur** Dist- Solapur has worked in our organization on a project assigned by us.

He has worked on the project named "**A study on general awareness about health insurance and customer satisfaction with special reference to IFFICO tikio inshurance company Pvt ltd.**" He has successfully completed his internship from 3rd June, 2019 to 3rd July, 2019 at **IFFICO tikio,** solapur.

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For IFFICO-TOKIO insurance company Pvt ltd.

HR Department

Scanned with CamScanner

RAJ INDUSTRIES

GAT NO. 169/78 GANESH NAGAR TALAWADE ROAD, CHINCHWAD PUNE- 411092
(ISO 9001:2015 IN110248A)

DATE: 04/07/2019

TO WHOHEVER IT MAY CONCERN

This is to certify that **Mr. Lawate Akshay Bhiva** From **Sveri's College Of Engineering, Pandharpur** at **Punyashlok Ahilyadevi Holkar Solapur University** for the course of **MBA** , semester-III for academic year 2019-2020 ,and he is completed his project Report entitled **"A Study Of Recruitment & Selection Process"** in our Organization from 4th June to 4th July 2019.

During the period of internship, he was found to be ambitious and hardworking; His commitment to learn and work gives lot of pleasure in issuing this certificate to his.

We wish his success for all future endeavors.

For Raj Industries

RAJ INDUSTRIES PUNE-19 CHINCHWAD

Authorized Signatory

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Estd. Dt. 24th Nov. 1979

Reg. No. S.U.R./ P.R.G. (A) Dt. 7 / 28-1-1980

SANGOLE

SHETKARI SAHAKARI SOOT GIRNI MARYADIT; SANGOLE

DIST. SOLAPUR. PIN-413 307 (M.S.)

Prof. NANASAHEB LIGADE
CHAIRMAN 7218180001
GOVINDRAO JADHAV
VICE CHAIRMAN 9421023090
SANJAYKUMAR ANUSE
MANAGING DIRECTOR 9423593703

■ PHONE : (02187) 220301, 220302, 220303 ■ FAX : (02187) 220370 ■ E-mail : shecospin@gmail.com ■ (www.shecospin.org)

S.S.S.G./T.O/H.P/2019. **Date:-07/09/2019**

TO WHOMESOEVER IT MAY CONCERN

This is to certify that Mr. **Swapnil Balkrushna Ropalkar,** a Student of the **SVERI's College of Engineering, MBA Department Pandharpur Dist- Solapur** has worked in our organization on a project assigned by us.

He has worked on the name **"A STUDY ON COST ANALYSIS WITH SPECIAL REFERENCE TO SHETKARI SAHAKARI SOOT GIRNI MARYADIT, SANGOLE, DIST-SOLAPUR".**

He has successfully completed his internship from 12th June, 2019 to 12th July, 2019 at **Shetkari Sahakari Soot Girni Maryadit, Sangole.**

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

We wish him all the best his future assignments.

SHETKARI SAHAKARI SOOT GIRNI LTD. Dist. Solapur SANGOLA

Labour Welfare Officer

Scanned with CamScanner

Micro Dynamic Software company

Microdynamic Software

Date:- 8th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Dongare Vishal Vilas** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur**, Punyashlok Ahilyadevi Holkar Solapur University, has worked in our organization on a project assigned by us.

He has worked on the project named "**A study on Training and Development at Micro dynamic Software Company Pune.**" He has successfully completed his internship from 6th June, 2019 to 8th July, 2019 at **Pune**.

During the period of internship he was found to be, ambitious and hard working. His Commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For Micro Dynamic Software, Pune.

Sangita Fulband.
(Asst. Manager HR)

103, Vitthal Complex,
Above Hotel Royal Pure Veg near Selfy Point,
Narhe, Pune Maharashtra 411041

Scanned with CamScanner

VITTHAL AUTOMOTIVE PANDHARPUR

Dealers for MAHINDRA & MAHINDRA LTD.
(Tractor Divison)

mahindra

Ref. No.:

Date :

Date:- 4th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Dongare Sangram Ranjit** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur**, Punyashlok Ahilyadevi Holkar Solapur University, has worked in our organization on a project assigned by us.

He has worked on the project named "**A study on customer perception towards Mahindra Tractors, authorized service center with special reference to Vitthal Automotive.**" He has successfully completed his internship from 3rd June, 2019 to 3rd July, 2019 at **Vitthal Automotive** of Pandharpur.

During the period of internship he was found to be, ambitious and hard working. His Commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For **Vitthal Automotive** of Pandharpur.

Asst. Manager HR:- Shivaji Mutkule.

Vitthal Automotive Pvt. Ltd. Pandharpur

OFFICE: Gat No. 410 Pandharpur Pune Road , Lokhande Wasti, At/Post - Wakhari Tal- Pandharpur 413304

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G4S Facility Services (India) Pvt. Ltd.
CIN No. U67120DL1981PTC102278
No. 14B/1/1 Avdhut Heights Office No.3
3rd Floor, Near Bank Of Baroda / Petrol Pump
Thite Nagar, Kharadi Pune -411014
INDIA

www.g4s.in

Date:- 4th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Sahil Jamil Shaikh** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur** Dist- Solapur has worked in our organization on a project assigned by us.

He has worked on the project named "**A study on work life balance of employees with G4S Facility Services (I) Pvt. Ltd**" He has successfully completed his internship from 1st June, 2019 to 5th July, 2019 at **G4S,** Pune.

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For G4S Facility Services (I) Pvt. Ltd.

Mr. Pradipkumar Patole

Asst. Manager HR

G4S Facility Services (India) Pvt. Ltd. PUNE

Scanned with CamScanner




श्री संत दामाजी सहकारी
साखर कारखाना लि., मंगळवेढा
ता.मंगळवेढा, जि.सोलापूर
महाराष्ट्र- 413 305

hri Sant Damaji Sahakari
r Karkhana Ltd., Mangalwedha
ngalwedha, Dist. Solapur. (M.S.) 413 305
2188) 244156, 244345, 244356, 244556
) 244145 E-Mail : santdamajissk@gmail.com

समाधान महादेव आवताडे
चेअरमन

No. Sant Damaji /ADM /2019-20 785 Date :-05/07/2019

TO WHOM IT MAY CONCERN

This is to certify that ***Miss. Rupali Prakash Gaikwad*** *a student of the* ***SVERI'S College of Engineering, Pandharpur, Dist-Solapur****. has worked on a project assigned by us, name was "****A Study on employees performance appraisal in Sugar Factory with special reference to Shri Sant Damaji Sahakri Sakhar Karkhana Ltd Mangalwedha****" She has successfully completed her internship from* ***5th June. 2019 to 5th July, 2019****.*

During the period of internship she was found to be, ambitious and hard working. Her commitment to learn and work gives lot of pleasure in issuing this certificate to her.

I wish her success for all future endwavors.

Guide : ***Mr.Dagadu Babasaheb Fate.***
Designation : *I/c Office Superintendent*
Organization : *Shri Sant Damaji S.S.K.Ltd, Mangalwedha.*

Reg.No. IR/MDA/PRG A)15/(S)1989 Dt.26/4/1989

Managing Director
Shri Sant Damaji SSK Ltd., Mangalwedha

Scanned with CamScanner

A PUNJALAL G. DAVE COMPANY
5, Neelkanth Market, M. G. Road, Ghatkopar (East)
Mumbai 400077, India.
Tel.: +91 22 21024341 | 21022342 | +91 99203 29111
www.pgdgroup.com | admin@pgdave.com

PGD GROUP
we Build trust | since 1960

INTERNSHIP CERTIFICATE

Date : 15.07.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Ms. Ashwini Sambhaji Mane, is a student of MBA in Shri Vithal Education & research Institute College of Engineering, Pandharpur, Solapur University, State – Maharashtra has successfully completed 01 month (16.06.2019 to 15.07.2019) internship programme at PGD Land LLP. She has worked on the project named "To study customer satisfaction & expectation with regards to real estate for PGD Land LLP."

During the period of her internship programme with us she was found punctual, hardworking and Inquisitive.

We wish her every success in career & life.

For **PGD Land LLP,**

Authorized Signatory

PGD LAND LLP PUNE

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केनरा बैंक Canara Bank

Canara Bank, Pandharpur,

Udyog Bhavan, Paschim Dwar,

Main Road, Pandharpur,

Dist. Solapur,

(Maharashtra) – 413304.

Branch: PANDHARPUR.
Contact: 02186-225713
Email:cb2676@canarabank.com

Date: - 4th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Randive Vikram Vinayak** a student of the SVERI'S college of Engineering, Pandharpur, MBA Department, Pandharpur, Dist. - Solapur has worked in our organization on a project assigned by us.

He has worked on the project named **"To Study On Comparative Analysis Of Bank In Terms Of Service Quality With The Reference To Canara Bank, Pandharpur"** He has successfully completed his internship from 4th June 2019 to 4th July 2019 at **Canara Bank, Pandharpur.**

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

कृते कॅनरा बँक
For Canara Bank

For Canara Bank.

प्रबंधक
Manager
Manager
पंढरपूर महाराष्ट्र
Pandharpur. Maharashtra
Canara Bank

Pandharpur.

Scanned with CamScanner

KBPlus Software System Pvt. Ltd.
E-mail : kbplussoftwaresystem@gmail.com

Date: 08/07/2019

TO WHOMEVER IT MAY CONCERN

This is to certify that Mr. MUJJMEEL JAHANGIR INAMDAR appearing at SVERI'S COLLEGE OF ENGINEERING, PANDHARPUR Dist.- Solapur for the course of MBA, Semester-III for academic year 2019-2020, and he is completed his Project Report entitled "TO STUDY ON CUSTMER PERCEPTION WITH REGARDING DIGITAL MARKETING" in our organization from 8th June 2019 to 8th July 2019.

The work prepared by Mr. Mujjmeel Jahangir Inamdar in partial fulfillment for the award of the degree of Masters in Business Administration (MBA).

During the period of internship, he was found to be ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to his.

I wish his success for all future endeavors.

For KB Plus Software System Pvt.Ltd.

Mr. Abdul Malik.

Asst.Manager HR

08/07/2019

KBPLUS SOFTWARE SYSTEM PVT. LTD

Scanned with CamScanner

RELIABILITY IN ROTATION

FLEXIBLE COUPLINGS

Ref. No.- COEP/MBA/2019-20/04

Date -08.07.2019

TO WHOM-SO-EVER IT MAY CONCERN

This is to certify that **MISS.POOJA SHIVAJI SURYAWANSHI** MBA Student of "Shri Vithal Education & Research Institute's College of Engineering, Pandharpur" worked for summer Internship project entitled **"A STUDY ON WAGES & SALARY ADMINISTRATION"** in our company from **8 June 2019 to 8 July 2019** with our entire satisfaction.

During his project period we found her a sincere, honest, hardworking, dedicated student with a professional attitude and very good job knowledge. She is amiable in nature and character is well. We wish her every success in life.

From

Utkarsh Transmission Pvt. Ltd.

UTKARSH TRANMISSIONS ★ SATARA

DEPUETY GENERAL MANAGER (D.G.M.)

Date: 08.07.2019

UTKARSH TRANSMISSIONS PVT. LTD.

Reg. Office : 27, Kanga Colony, Sadar Bazaar, Satara - 415002
Factory Address :-M-15/2, Additional MIDC, Satara - 415004
Corporate Identity Number : -U25192MH1994PTC082990
Phone No : 02162-240574 / 240974, Fax No. : 02162 - 240174
Email : sales@utlcoupling.com, Website : www.utlcoupling.com

Scanned with CamScanner

Vitthal Corporation Ltd.
SUGAR • CO-GENERATION • DISTILLERY • IMFL • TEXTILE
Registered office : Flat No.104, Suwarnanand Park, Plat No.48-49
Laxmi Park, Navi Peth, Pune Maharashtra-411030 Tel-020 24532730

VCL/SUGAR/AGRI/2019-2020/3452

Date : 18/07/2019

CERTIFICATE

This is to certify **Mr. Sarjerao Balbhim Pakhare** doing MBA in SVERI'S College of Engineering Pandharpur. Has Successfully Undergone Summer Internship Project (SIP) **"A STUDY ON EMPLOYEE JOB SATISFATION OF VITTHAL CORPORATION LTD. MHAISGAON (SUGAR INDUSTRY)"** under guidance of Mr. Yashwant Shinde (Managing Director) & Mr. Bhaskar Gavhane (HR Manager) during the period **15th june to 14th july 2019 (30 Days).**

Hi has been acquainted with the work and functioning of our organization we wish in success in his career.

Managing Director
Vitthal Corporation Ltd.

Correspondence Address / Works
halrao Shinde Nagar, Post. Mhaisgaon, Tal. Madha, Dist. Solapur - 413250 (Maharashtra)
Tal.No. +91 2183 226425, 226455, 226475 Fax: +91 2183 226595
Email: vitthalsugarmfg@gmail.com Website : www.vitthalcorporationltd.com

Scanned with CamScanner

G4S Facility Services (India) Pvt. Ltd.
CIN No. U67120DL1981PTC102278
No. 198/1/1 Avdhut Heights Office No. 3
3rd Floor, Near Bank Of Baroda / Petrol Pump
Thite Nagar, Kharadi, Pune - 411014
INDIA

www.g4s.in

Date:- 4th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Nanaware Prashant Balu** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur** Dist- Solapur has worked in our organization on a project assigned by us.

He has worked on the project named **"A study on awareness of Integrated Facility Management Services and Willingness to consider availing such services with G4S Facility Services Pvt. Ltd"** He has successfully completed his internship from 3rd June, 2019 to 3rd July, 2019 at **G4S**, Pune.

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For G4S Facility Services (I) Pvt. Ltd.

Mr. Pradipkumar Patole

Asst. Manager HR

G4S Facility Services (India) Pvt. Ltd. PUNE

Securing Your World

ISSA MEMBER® The Experts on Cleaning and Maintenance

Registered Office
C-16, Community Centre, Janakpuri
Behind Janak Cinema, New Delhi - 110 058
Ph. No. +91-11-66222900, Fax No.: 91-11-66222901

Scanned with CamScanner

HYUNDAI

NEW THINKING. NEW POSSIBILITIES.

Date: 02/07/2019

TO WHOM IT MAY CONCERN

This is to certify that Miss. **Jeva Khatoon**, student of **Master of Business Administration** (MBA) of **SVERI's college of engineering, Pandharpur** (Solapur University) has successfully completed summer internship in the field of **Human Resources Management (From 01-06-2019 To 30-06-2019)** with titles "To study of job satisfaction of employees with **Surjeet Hyundai**, reference to subject Hyundai, 27-G Near Minal JK Road Bhopal (M.P.)

During the period of her internship program with us she had been exposed to different process was found Punctual, Hard working and Inquisitive, She was very Diligent, Sincere, Attentive and her Participation with various activities was highly appreciable and excellent.

We wish her every success in her life and career.

For,

Surjeet Auto Pvt. Ltd.

SURJEET AUTO PVT. LTD. BHOPAL Mob. 9200811013

Authorized Signatory

SURJEET HYUNDAI
G- 27, J.K. Road, Bhopal,
Ph.: 8889200749, 8889200798
email : sales@surjeethyundai.com

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SSV ENGINEERS PVT. LTD.

CIN No. : U29299PN2008PTC131611 2007-2008
AN ISO 9001:2008 , ISO 1400 : 2004 & OHSAS 18001:2007 CERTIFIED COMPANY
Registered Office- Unit I : E-110, General Block, M.I.D.C., Bhosari, Pune - 411 026.
Maharahtra, (India) Phone : +91-020-66353900 Fax : +91-020- 66353934

SSV\HRD

Date: July 11, 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Miss DEVKAR MINAKSHI DATTATRAY** a student of Shri Vithal Education And Research Institute's College Of Engineering, MBA Department, Pandharpur has Successfully completed her summer internship in our organization.

Her topic was "**A study on Satisfaction about employee compensation**" **with reference to SSV ENGINEERS PVT. LTD in Pune.**

She has successfully completed her internship from 10th June 2019-10th July 2019.

During the period of internship we found that she was sincere & hardworking.

I wish all the best for her successful future.

HR Manager

SSV ENGINEERS PVT. LTD. Bhosari, Pune

FOR SSV ENGINEERS

: vmshinde@ssvpune.com

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पंढरपूर बँक
PANDHARPUR BANK
THE PANDHARPUR URBAN CO-OPERATIVE BANK LTD.

दि पंढरपूर अर्बन
को-ऑप.बँक लि.पंढरपूर

पत्र नं.: १०२१

दिनांक : 12 JUL 2019

TO WHOMSOEVER IT MAY CONCERN

CERTIFICATE

This is to certify that, **Miss. Doshi Nikita Harshvarhan,** Student of SVERI's College of Engineering, Pandharpur has completed summer/in-plant training/project work in section of our organization from 10th June 2019 to 10th July 2019.

During the joining period she was found to be sincere and hardworking. We wish her all the in success future.

Pandharpur Urban Co-op. Bank Ltd. HEAD OFFICE

Chief Executive Officer

Scanned with CamScanner

SUMEET FACILITIES LIMITED
Formerly Known as Sumeet Facilities Pvt. Ltd.
ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007, ISO 26000:2010
Integrated Facility Management Services | CIN NO.: U74140PN1992PLC068072
"Summit House", Plot No. 64/21, D-II Block, M.I.D.C., Chinchwad, Pune - 411 019.

SUMEET FACILITIES LIMITED

Date: 06/07/2019

Ref No. : SFL/HR/Pro.cert/2019

TO WHOMEVER IT MAY CONCERN

This is to certify that **Ms. Rupali Anand Khune** appearing at **SVERI'S COLLEGE OF ENGINEERING, PANDHARPUR**, Dist - Solapur for the course of MBA, Semester- III for academic year 2019-2020, and she is completed her Project Report entitled **"TO STUDY ON WAGES AND SALARY ADMINISTRATION"** in our organization from 6st June 2019 to 6th July 2019.

The work prepared by Ms. Rupali Anand Khune in a partial fulfillment for the award of the degree of Masters in Business Administration (MBA).

To the best of my knowledge and belief the work prescribed in this report is an authentic work and is not reproduced from any source.

We wish her all the best for his future assignments.

For SUMEET FACILITIES LIMITED,

SUMEET FACILITIES LTD. PUNE

Vinayak Totare
Manager – HR & Admin

Scanned with CamScanner

Gokul

Founded : 16-3-1963 Reg. No. KPR/PRD/ (A) 102

Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd.

B-1, M. I. D. C., Gokul Shirgaon, Kolhapur - 416 234 (M.S.)

• Ph. : 0231- 2672311 to 15 (5 Lines) • Fax : 0231 - 2672374.

• website : www.gokulmilk.coop • E-mail : kpr_gokul@sancharnet.in

KDS/ADMN/ 8049 / Date : 30/8/19

To Whomsoever It May Concern

Certificate

This is to certify that Ms. Puja M. Jamdar *Student of* SVERI's College of Pandharpur *has completed Summer / Inplant Training / Project Work in* Marketing *Section of our Organisation from* 03/06 / 2019 *to* 03/07 / 2019 *. During the training period he / she / they was / were found sincere and hardworking.*

We wish him / her / them all the success in future and best luck.

for **Manager (Admn.)**

Scanned with CamScanner

Founded : 16-3-1963
Reg. No. KPR/PRD/ (A) 102
Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd.
B-1, M. I. D. C., Gokul Shirgaon, Kolhapur - 416 234 (M.S.)
• Ph. : 0231- 2672311 to 15 (5 Lines) • Fax : 0231 - 2672374.
• website : www.gokulmilk.coop • E-mail : kpr_gokul@sancharnet.in

KDS/ADMN/ 8049 /

Date : 30/8/19

To Whomsoever It May Concern

Certificate

This is to certify that Ms. Sejal R. Shah
Student of SVERI's College of Pandharpur *has completed Summer / Inplant Training / Project Work in* HR *Section of our Organisation from* 03/06/2019 *to* 03/07/2019 . *During the training period he / she / they was / were found sincere and hardworking.*

We wish him / her / them all the success in future and best luck.

for **Manager (Admn.)**

Scanned with CamScanner

STERLING MOTORS

TATA MOTORS

TATA MOTORS DEALER FOR NASHIK, SOLAPUR, AHMEDNAGAR

Date:- 6th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Giram Suraj Satish** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur,** Punyashlok Ahilyadevi Holkar Solapur university, has worked in our organization on a project assigned by us.

He has worked on the project named "**A study on perception of customers towards advertising and sales promotion of Sterling Motors for TATA Motors showroom.**" He has successfully completed his internship from 5th June, 2019 to 5th July, 2019 at **Sterling Motors,** Solapur.

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For Sterling Motors, Solapur.

STERLING MOTORS SOLAPUR STERLING MOTORS

G. S. Irabatti
(General Manager)

Scanned with CamScanner

Hamirani Metals

NABCB ISO 9001 : 2015

Date: 05th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **MISS. VIDYARANI RAJARAM BEHERE** from 'Shree Vithal Education & Research Institute's College of Engineering, Pandharpur' has successfully completed her project on **"Training & Development".**

Since the period 05th June 2019 to 5th July 2019 in our organization.

During this project duration, we found her sincere, hard working & eager to learn.

We wish Best of Luck for her future education & career.

For Hamirani Metals Pvt. Ltd.

Hamirani Metals Pvt. Ltd. Pune

Mr. Ajinkya Kshirsagar
(HR Manager)

Scanned with CamScanner

Tejas Agro Irrigation Systems Pvt. Ltd.

Manufacturer :- Tejas Pipes, Tejas Drip, Tejas Fittings, Tejas Polyfittings

Gat No. 977/1/1, Bhandishegaon, Tal. Pandharpur, Dist. Solapur (MAHARASHTRA)

Website : www.tejasagro.com Email ID : info@tejasagro.com Customer Care No. : 9075022220

Tejas Pipes

Tejas Drip

Date: 20th July, 2019

TO WHOM SO EVER IT MAY CONCERN

This is certifies that **Miss. MONALI ASHOK YELPALE** studying MBA in SVERI's COLLAGE OF ENGINEERING, PANDHARPUR has done a Project work entitled **"TO STUDY OF EMPLOYEES' WALLFARE MEASURES WITH REFERANCE TO TEJAS AGRO IRRIGATION SYSTEMS PVT. LTD."** in our organization for period of 30 Days, from **16th June, 2019 to 16th July, 2019.**

During the tenure, she was keen in observation and her project. Her conduct & character found to be good.

We wish all the best for her future endeavor

Tejas Agro Irrigation Systems Pvt. Ltd.

Mr. Pravin M. Shivsharan

(H.R. Manager, TAISPL)

Scanned with CamScanner

Estd. Dt. 24th Nov. 1979

Reg. No. S.U.R./ P.R.G. (A) Dt. 7 / 28-1-1980

SANGOLE

SHETKARI SAHAKARI SOOT GIRNI MARYADIT; SANGOLE

DIST. SOLAPUR. PIN-413 307 (M.S.)

Prof. NANASAHEB LIGADE
CHAIRMAN 7218180001
GOVINDRAO JADHAV
VICE CHAIRMAN 9421023090
SANJAYKUMAR ANUSE
MANAGING DIRECTOR 9423593703

■ PHONE : (02187) 220301, 220302, 220303 ■ FAX : (02187) 220370 ■ E-mail : shecospin@gmail.com ■ (www.shecospin.org)

S.S.S.G./T.O./H-J/2019. Date: - 07/08/2019

TO WHOMESOEVER IT MAY CONCERN

This is to certify that MR. **Akshay Sevagiri Gosavi,** a student of the **SVERI's College of Engineering, MBA Department Pandharpur Dist- Solapur** has worked in our organization on a project assigned by us.

He has worked on the project named "**A Study On Awareness and Satisfaction Level of Welfare Facilities Provided by Shetkari Sahakari Soot Girni Ltd. Sangole.**" He has successfully completed his internship from 12th June, 2019 to 12th July, 2019 at **Shetkari Sahakari Soot Girni Ltd. Sangole.**

During the period of internship he was found to be, ambitious and hard working. His commitment to learn and work gives lot of pleasure in issuing this certificate to him.

We wish him all the best in his future assignments.

SHETKARI SAHAKARI SOOT GIRNI LTD. Dist. Solapur SANGOLA

Labour welfare officer.

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Reg.No.SAN/PRG-(A)-11 Date 27/09/1990

बाबासाहेब देशमुख शेतकरी सहकारी सूत गिरणी मर्यादित,
आटपाडी-४१५ ३०१, जि. सांगली (महाराष्ट्र)

BABASAHEB DESHMUKH SHETKARI SAHAKARI SOOT GIRNI
MARYADIT, ATPADI - 415 301, DIST. SANGLI (MAHARASHTRA)

Ph. (02343) 221165, 221166. Email ID- bdsgirni@gmail.com / bdsgirni_atpadi@rediffmail.com

संस्थापक चेअरमन- श्री. ना.र. उर्फ राजेंद्र बाबासाहेब देशमुख Founder Chairman : N.R. Alies Rajendra Babasaheb Deshmukh

Ref. Date: 01/08/2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Akshay Tajaji Sartape** a student of th **SVERI's Collage of Engineering, MBA Department, Pandharpur** Dist. Solapur has worked in our organization on a project assigned by us.

He has worked on the project with **"Babasaheb Deshmukh Shetkari Sahakari Soot Girni Maryadit, Atpadi"**. He has successfully completed his internship from 10 Jun 2019 to 10 July 2019 at Atpadi.

During the period of internship has was found to be, ambitions and hard working. His commitment to learn and work given lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For Babasaheb Deshmukh Shetkari Sahakari

Soot Girni Maryadit, Atpadi.

01/08/19

(U.N. Nagane)

Managing Director

Babasaheb Deshmukh Shetkari Sahakari Soot Girni Maryadi • Atpadi Dist.Sangli • Reg. No. SAN/PRG-(A)-11 Date 27/09/1990

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CRENTA CHEMICAL

MFG & MARKETING ALL MICRONUTRIENTS
Plot No. A-07, M.I.D.C. TEMBHURNI,
Tal.Madha, Dist.Solapur - 413 211 (M.S.)
Ph. (02183) 232207, Cell. - 9637960777, 9637960666
email: crenta7@gmail.com
website : www.crentachemical.com

Date: 01/07/2019

TO WHOM SO EVER IT MAY CONCERN

This is certify that Miss. Manisha Sahebrao More a student of Shree Vittal Education And Research Institute's College of Engineering, MBA Department, Pandhapur she is successfully completed her summer internship in our company. Her topic was "A study on RECOVERY MANAGEMENT".

She has successfully completed her internship from 01/06/2019 to 01/07/2019.

During the period of internship we found that she was sincere and hard working. I wish all the best for her successful & bright future.

Financial Manager
Mr. Dashrath Thorat

For Crenta Chemical
Mr. Rajaram Ganpat Yewale
M.D.

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NIKHO ENGINEERS

W-172, S-Block, M.I.D.C. Bhosari, Pune - 411 026. Maharashtra, India.
Mobile No. : +91 9970809999, E-mail : shindeshivajim@gmail.com

AGSI CERTIFICATION QMS

NIKHO\HRD

Date: July 11, 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Miss. SAKSHI VISHNUKANT KHANDELWAL** a student of Shri Vithal Education And Research Institute's College Of Engineering, MBA Department, Pandharpur has Successfully completed her summer internship in our organization.

Her topic was "**A study on Employee Motivation" with reference to NIKHO ENGINEERS PVT. LTD. in Pune**

She has successfully completed her internship from 10th June 2019-10th July 2019.

During the period of internship we found that she was sincere & hardworking.

I wish all the best for her successful future.

NIKHO ENGINEERS W-172, S-Block, M.I.D.C. PUNE-411 026

HR Manager

For **NIKHO ENGINEERS**

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Cipla

November 21, 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Miss Pranjali Sayaji Inamdar a student of SVERI's College of Engineering, MBA Department, Pandharpur. Dist. Solapur under Punyashlok Ahilyadevi Holkar, Solapur University, Solapur has worked in our organization on a project assigned by us.

She has worked on the project "A Study on Employee Retention" in Cipla Ltd at Kurkumbh". She has successfully completed her 30 days internship in the field of Human Resource from 4th June, 2019 to 3rd July, 2019 at Cipla Ltd, Kurkumbh. Tal. Daund under the guidance of Mr. Vikas Shinde.

During the period of her internship, she was found to hard working. I wish her success for all her future endeavors.

Vinayak Kale
Associate Director - HR

CIPLA LIMITED * HBH * KURKUMBH 413 802 * MIDC, KURKUMBH

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Bafna Motors (Pune) Pvt. Ltd.
Passenger Car Dealer

TATA MOTORS

DATE : 24th DEC 2019

To Whom It May Concern

This is to certify that **Mr. Swapnil Satywan Vyavahare**. Student of **Punyashlok Ahilyadevi Holkar Solapur University, Solapur**, has successfully completed his internship at our service station. He was engaged with our organization from 01.06.2019 to 15.07.2019, at our Sahakar Nagar branch. During this period he was found honest, hardworking & sincere. He bears a good moral character.

We wish him success for his future.

From Bafna Motors (Pune) Pvt. Ltd.

SERVICE UNIT HEAD

BAFNA MOTORS (PUNE) PUNE

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SBI

STATE BANK OF INDIA

KARKAMB

Ref No: -

Date:- 1/08/2019

CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. Khare Vishal Gahininath** is a student of

SVERI'S COLLEGE OF ENGINEERING, PANDHARPUR

Dist.Solapur has completed her summer internship project in title **"A study on internet banking facility awareness among the SBI bank account holders in SBI karakamb branch".** He has completed his project work from **03/06/2019** to **03/07/2019** during the project he was found practical sincere and hardworking.

भारतीय स्टेट बैंक SBI 4684 करकंब शाखा

Signature

(Branch Manager)

Address:

Somwar Peth karkamb

Tal Pandharpur, Solapur,

Maharashtra, Karkamb 413302

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M/s. SONALI TRACTORS

02189-232130
232152

TAFE

Market Yard, Near D.C.C.Bank, MOHOL-413213.
Ph. 2189-232130,232152

AUTHORISED DEALERS: TAFE & MASSEY FERGUSON TRACTORS SALES, SERVICES OF SPARES

No.

DATE : / /20

Date:- 8th July 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Satpute Chetan Arjun** a student of the **SVERI's College of Engineering, MBA Department, Pandharpur,** Punyashlok Ahilyadevi Holkar Solapur University, has worked in our organization on a project assigned by us.

He has worked on the project named **"A study on rural customer behaviour of purchasing Tafe Tractor, authorized service center with special reference to Sonali Tractor."** He has successfully completed his internship from 6th June, 2019 to 8th July, 2019 at **Mohol.**

During the period of internship he was found to be, ambitious and hard working. His Commitment to learn and work gives lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For Sonali Tractors Mohol.

SONALI TRACTORS Market Yard, Mohol

(Asst. Manager HR)

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यूनियन बैंक
ऑफ इंडिया

Union Bank
of India

Union Bank of India
Good people to bank with

PANDHARPUR BRANCH

>>>

Nestlé Good Food, Good Life

NESTLE INDIA PVT.LTD.
ICC Chambers, Saki
Vihar Road,Muranjan Wadi,
Marol,Andheri East,Mumbai
Maharashtra 400072
+91 9766755760/9132551414
https://www.nestle.in

TO WHOM IT MAY CONCERN

This is to certify that **Mr.Swapnil Suryakant Kamble** of **SVERI's College of Engineering Pandharpur**. He has undergone **Indusrtial Training** with us in the **Finance Department** from **5th July, 2019 to 20th August, 2019.**

During his above tenure we found him to be sincere, hardworking, willing and eager to learn.

We wish him all success in his future endeavor.

FOR **NESTLE INDIA PVT.LTD.**

NESTLE INDIA PVT.LTD. MUMBAI 400072

AUTHORISED SIGNATURE

Date : 21/10/2019
Place: Mumbai

Scanned with CamScanner

Date 06/07/2019

TO WHOHEVER IT MAY CONCERN

This is to certify that **Mr. Abhijeet Suresh Tarate** from **Sveri's College Of Engineering. Pandharpur** at **Punyashlok Ahilyadevi Holkar Solapur University** For the course of MBA, semester-III for academic year 2019-2020, and he is completed his project Report entitled **"A Study Of Recruitment & Selection Process"** in our organization From 5th June 2019 to 5th July 2019.

During the period of internship, he was found to be ambitious and hardworking, His commitment to learn and work give lot of pleasure in issuing this certificate to his.

We wish his success for all future endeavors.

For Real Dairy Industries Pvt.Ltd.

Manoj Tupe
Chairman & M.D.

Real Dairy Industries Pvt. Ltd. MIDC Baramati 413133

HR Manager.

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HONDA

Date- / /2020

CERTIFICATE

This is to certify that **Mr.Aditya Dhanjay Gaikwad a Student of SVERI'S** college of engineering Pandhapur Dist. Solapur has worked in our organization on a project assigned by us. He has worked on the project named "**A STUDY ON CUSTOMER SATIFACTION TOWARDS "HONDA BIKE" WITH SPECIAL REFERENCE OF SANGRAM WHEELS PVT LTD.** He has successfully completed his summer internship in "**SANGRAM WHEELS PVT LTD**" during the period of 07/06/2019 to 09/07/2019 his project he was participated in all showroom activity. We wish him all the best in future.

Sangram Wheels Pvt. Ltd. MH 370001 Pandharpur

MANAGER

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Reg No SAN/PRG-(A)-11 Date 27/09/1990



बाबासाहेब देशमुख शेतकरी सहकारी सूत गिरणी मर्यादित,
आटपाडी-४१५ ३०१, जि. सांगली (महाराष्ट्र)

BABASAHEB DESHMUKH SHETKARI SAHAKARI SOOT GIRNI MARYADIT, ATPADI - 415 301, DIST. SANGLI (MAHARASHTRA)

(2343) 221165 221166 Email ID- bdsgirni@gmail.com / bdsgirni_atpadi@rediffmail.com

संस्थापक अध्यक्ष- श्री. ना.र. उर्फ राजेंद्र बाबासाहेब देशमुख Founder Chairman : N.R. Alias Rajendra Babasaheb Deshmukh

Date 01/08/2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Dhandore Vijay Sanjay** a student of th **SVERI's Collage of Engineering, MBA Department, Pandharpur** Dist. Solapur has worked in our organization on a project assigned by us.

He has worked on the project with **"Babasaheb Deshmukh Shetkari Sahakari Soot Girni Maryadit, Atpadi"**. He has successfully completed his internship from 10 Jun 2019 to 10 July 2019 at Atpadi.

During the period of internship has was found to be, ambitions and hard working. His commitment to learn and work given lot of pleasure in issuing this certificate to him.

I wish him success for all his future endeavors.

For Babasaheb Deshmukh Shetkari Sahakari

Soot Girni Maryadit, Atpadi.

01/08/19

(U.N. Nagane)

Managing Director

Babasaheb Deshmukh Shetkari Sahakari Soot Girni Maryadit Atpadi Dist. Sangli
Reg No SAN/PRG-(A)-11 Date 27/09/1990

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Gokul
Founded : 16-3-1963
Reg. No. KPR/PRD/ (A) 102
Kolhapur Zilla Sahakari Dudh Utpadak Sangh Ltd.
B-1, M. I. D. C., Gokul Shirgaon, Kolhapur - 416 234 (M.S.)
• Ph. : 0231- 2672311 to 15 (5 Lines) • Fax : 0231 - 2672374.
• website : www.gokulmilk.coop • E-mail : kpr_gokul@sancharnet.in

KDS/ADMN/ 8049 /

Date : 30/8/19

To Whomsoever It May Concern

Certificate

This is to certify that Ms. Revati M. Hingmire *Student of* SVERI's College of Pandharpur *has completed Summer / Inplant Training / Project Work in* HR *Section of our Organisation from* 05/06/2019 *to* 05/07/2019 *. During the training period he / she / they was / were found sincere and hardworking.*

We wish him / her / them all the success in future and best luck.

for **Manager (Admn.)**

युनाइटेड इंडिया इंश्युरेन्स कंपनी लिमिटेड

भारतीय साधारण बिमा निगम की सहायक

United India Insurance Co. Ltd.

(Subsidiary Of Jeneral Insurance Corpopation Of. India)

BRANCH OFFICE - Bank Of Baroda Building, Swa, Veer Savarkar Path, PANDHARPUR - 413304

Ph.:- (02186) 223816 Office Code:- 161209

Date: July 04, 2019.

Certificate Of Internship

This is to certify that **Mr. Suraj Yashwant Chavan**, Student of MBA-2 in SVERI's College of Engineering Pandharpur, Punyashlok Ahilyadevi Holkar Solapur University, has completed the project entitled **"A Study On Awareness of Health Insurance Products in Pandharpur Area & Claim Settlement Process with reference to the United India Insurance Company."** during the period between June 03, 2019 to July 03, 2019 in our Organization.

We found him to be a self starter who is motivated, duty bound & Hard-working. He worked sincerely on his assignment & his performance was Excellence.

For United India Insurance Co. Ltd.

Mr. Vijay Aundhakar
(Branch Manager)

United India Insurance Co. Ltd. 161209 Pandharpur

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SVERI's
College of Engineering, Pandharpur

Department of Master of Business Administration (MBA)

Sample Project Report

A.Y.: 2019-2020

A

PROJECT REPORT

ON

"A STUDY ON AWARENESS OF INTEGRATED FACILITY MANAGEMENT SERVICES AND WILLINGNESS TO CONSIDER AVAILING SUCH SERVICES WITH RESPECT TO G4S FACILITY SERVICES (INDIA) PVT LTD."

Submitted to

P. A. H. SOLAPUR UNVERSITY, SOLAPUR

IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE AWARD OF DEGREE IN

MASTER OF BUSINESS ADMINISTRATION

Submitted By

Mr. NANAWARE PRASHANT BALU

Under the guidance of

Miss. M. M. Bhore

B. Pharmacy, MBA (Marketing), M. Phil (Marketing)



College of Engineering, Pandharpur

MBA Department

2019-2020

S.V.E.R.I's

College of Engineering, Pandharpur

CERTIFICATE

It is certified that the project work entitled "**A STUDY ON AWARENESS OF INTEGRATED FACILITY MANAGEMENT SERVICES AND WILLINGNESS TO CONSIDER AVAILING SUCH SERVICES WITH RESPECT TO G4S FACILITY SERVICES (INDIA) PVT LTD.**" has been completed by successfully and submitted .

Mr. Prashant Balu Nanaware of MBA class in the partial fulfillment for the award of master's degree in **Master of Business Administration** as per curriculum laid by the **P. A. H. SOLPUR UNIVERSITY, SOLAPUR** during the academic year 2019-2020.

(Prof.K.B.Patil)
HOD

(Prof.M.M.Bhore)
Guide

(Dr.B.P Ronge)
Principal

G4S Facility Services (India) Pvt. Ltd.
CIN No. U67120DL1981PTC102278
No. 14B/1/1 Avdhut Heights Office No.3
3rd Floor, Near Bank Of Baroda / Petrol Pump
Thite Nagar, Kharadi Pune -411014
INDIA

www.g4s.in

ate:- 4th July 2019

TO WHOMSOEVER IT MAY CONCERN

his is to certify that **Mr. Nanaware Prashant Balu** a student of the **SVERI's College of ngineering, MBA Department, Pandharpur** Dist- Solapur has worked in our organization on a roject assigned by us.

le has worked on the project named **"A study on awareness of Integrated Facility Management Services and Willingness to consider availing such services with G4S Facility ervices Pvt. Ltd"** He has successfully completed his internship from 3rd June, 2019 to 3rd July, 019 at **G4S,** Pune.

During the period of internship he was found to be, ambitious and hard working. His ommitment to learn and work gives lot of pleasure in issuing this certificate to him.

wish him success for all his future endeavors.

or G4S Facility Services (I) Pvt. Ltd.

Mr. Pradipkumar Patole

Asst. Manager HR

G4S Facility Services (India) Pvt. Ltd. PUNE

DECLARATION

I am Prashant Nanaware, a student of MBA Semester-III, College of Engineering, Pandharpur. I hereby declared that this project report on "**A STUDY ON AWARENESS OF INTEGRATED FACILITY MANAGEMENT SERVICES AND WILLINGNESS TO CONSIDER AVAILING SUCH SERVICES WITH RESPECT TO G4S FACILITY SERVICES (INDIA) PVT LTD.**" has been prepared by me as a part of the requirement of the MBA program of **SOLAPUR UNIVERSITY, SOLAPUR** (Batch of 2019-2020), under the guidance of Miss. M. M Bhore.

This project submitted in partial fulfillment of the requirement for **Master of Business Administration** course is my original work and is the outcome of the practical knowledge and experience gained by me during the course of my summer internship.

Place: Pandharpur

Date: 10/01/2020

(Mr. Prashant Balu Nanaware)

ACKNOWLEDGEMENT

I take the opportunity to express my gratitude to all the concerned people who have directly or indirectly contributed towards completion of this project. I extend my sincere gratitude towards **G4S Facility Services (India) Pvt.Ltd** for providing me the opportunity and resources to work on this project. I am extremely grateful to **Mr. Shubham Dutta**, my mentor in **G4S** for his guidance and invaluable advice during the project. Also to my guide, **Miss M.M Bhore** whose insight encouraged me to go beyond the scope of the project and this broadened my learning on this project.

I would like to thank each and every person who helped me in completing the project.

Thank you,

(Mr. Prashant Balu Nanaware)

Place: Pandharpur

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CHAPTER 1

INTRODUCTION TO THE STUDY

CHAPTER 2

COMPANY PROFILE

CHAPTER 3

THEORETICAL BACKGROUND

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

CHAPTER 5

FINDINGS

CHAPTER 6

SUGGESTIONS *OR* CONCLUSION

1.1 INTRODUCTION – OVERVIEW OF THE SECTOR, ORGANIZATION AND THE STUDY:

In India Service Sector is the biggest one. The sector also provides employment to a large share of Indian population. As of 201s8, 34.49% of India's employed population was working in the service sector. Also services exports comprise a major part of the total exports of India. Net Services exports from India stood at US$ 38.95 billion in H1 2018-19. India ranked as a eighth largest exporter of commercial services globally in 2017. Moreover, the sector is largest recipient of FDI in India with inflows of US$ 74.14 billion between April 2000 and March 2019. The FM Services market in India is predicted to grow at a CAGR of 17.19%during the forecasting period 2016-2020 owing to the development in the end-user industries.

The presence of global and Indian MNC's across end-users drives Facility Management Services segment in India. Among end-users IT/ITES/BFSI contributes more than 21% of revenue generated by the FM services market due to the recent boom and investment in the segment.G4S India is launched in 1989 and is considered as the leading security solution and facility services provider since its inception. Starting with the single employee G4S has grown spectacularly to their present strength of 130,000 employees. Today G4S has a strong nationwide network of 128 Hub, branches and area offices across India.

"Facility management (FM) is a profession that encompasses multiple disciplines to ensure functionality, comfort, safety and efficiency of the built environment by integrating people, place, process and technology".

The International Organization for Standardization defines FM as the "organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business."

Facility management can have many different titles and arrive in their profession through variety of career paths. They're responsible for making sure systems of the built environment, or facility, work harmoniously. Facility management contribute to the organization's bottom line through their responsibility for maintaining what is often an organization's largest and most valuable assets, such as property, buildings, equipment and other environments that house personnel, productivity, inventory and other important elements of operation. Facilities management services started as a little more than janitorial and caretaker services during the 1970s, involving building maintainers and cleaning. Cost-cutting by business in the 1970s and 80s led to outsourcing of non-core services such as lighting, heating, pumping to facility management companies.

G4S's core services include 'manned security services' – where it provides trained and screened security officers. The company also provides 'security systems' such as access control, CCTV, intruder alarms, fire detection, video analytics and security and building systems integration technology. Monitoring and response services' is another core service, where G4S provides key holding, mobile security patrol and response services and alarm receiving and monitoring facilities.G4S also provides 'secure facilities services' which includes integrated facilities services for entire sites or estates for commercial customers and governments. The business provides 'risk management and consultancy services' which also includes mine detection and clearance services. G4S also provides electronic tagging and monitoring of offenders at home or in the community. The company provides back-office support functions for police forces, support for front-line policing, including the provision of custody suite services and forensic medical services. This includes the management of all aspects of a facility and those held within the facility – similar centers are also used for the detention of asylum applicants. Prisoner escorting is another core service. G4S transports prisoners and asylum applicants between courts, police stations and custody centers.

G4S India currently provides the following services:

- Secure Solution
- Corporate and Industrial Investigation
- Beat Patrol
- Central Monitoring Responses
- Emergency Responses
- Fire and Safety Services
- Certified Protection Officer

This study is focused upon the awareness of integrated facility management services specifically on soft solution and the willingness of customer to consume this service, Consumer attitude, satisfaction level of the new client for G4S in Pune region.

This study is based on Descriptive research design. The respondents are Pune region and sample size is 50 the primary data was collected from client but they are new for G4S through a structured questionnaire. The Secondary data was collected from different sources; Company records, Website, integrated report & Internet.

1.2 OBJECTIVES OF THE STUDY:

The objectives of the study are;

i. To study the awareness of integrated facilities management services specifically soft solution services.

ii. To study the opinion of prospective clients with regards to G4S services.

iii. To identify prospective clients based on their willingness to avail the services of G4S and segment them on basis of scale of operations based on their turnover.

iv. To identify the expectations of customers with regards to soft solution services.

1.3 SCOPE AND LIMITATIONS OF STUDY:

The scope and limitations of the study are;

Scope:-

i. The study will be useful to check the awareness of client's with regards the integrated facility services.

ii. The study will help in identifying the prospective clients for G4S.

iii. The study will help G4S in understanding client opinion towards soft facility solution.

iv. The study will help the future researchers as a guide in the field of Marketing and especially sales department.

Limitations:-

i. Due to time constraints & busy schedules of the client it was difficult to interact with them completely.

ii. The study was restricted to limited number of respondents that is 50.

iii. The scope of study was limited to client in the Pune region.

1.4 Research Methodology:

Research is defined as human activity based on intellectual application in the investigation of matter. The primary purpose for research is discovering, interpreting & development of methods.

Research Design:

Research design is defined as a framework of methods and techniques chosen by a researcher to combine various components of research in a reasonably logical manner so that the research problem is efficiently handled. It provides insights about "how" to conduct research using a particular methodology. Every researcher has a list of research questions which need to be assessed – this can be done with research design.

The sketch of how research should be conducted can be prepared using research design. Hence, the market research study will be carried out on the basis of research design.

The design of a research topic is used to explain the type of research (experimental, survey, correlation, semi-experimental, review) and also its sub-type (experimental design, research problem, and descriptive case-study). There are three main sections of research design: Data collection, measurement, and analysis.

The type of research problem an organization is facing will determine the research design and not vice-versa. Variables, designated tools to gather information, how will the tools be used to collect and analyze data and other factors are decided in research design on the basis of a research technique is decided.

Research Type is Descriptive research design, researcher was studied
Sampling Technique is Stratified Sampling; Sample Unit is (Respondents) customer's of above 100cr turnover companies in Pune region. Sample Size is 50 Company as a customer primary data collected through Questionnaire (Both Open ended and Close ended questions).

Aim:

To analyze the customer's awareness, attitude, satisfaction & expectations about integrated facility service specifically on soft solution in Pun region.

Types of data:

The primary as well as the secondary sources is used for collection of data.

Primary data: Primary data involves the collection of data that does not already exist. This can be through numerous forms including questionnaires. In this study the primary data is collected with the help of structured questionnaire.

Secondary data: Secondary data involves the summary, collection &/or synthesis of existing research rather than primary research, where data are collected from. For example - research subjects.
In this study the secondary data is collected through the internet, company records, company website & various integrated report.

Primary data sources	Secondary data sources
1) Questionnaire	1) Company records, Website
	2) integrated report
	3) Internet

Data collection Technique:-

Data was collected through survey method with the help of a structured questionnaire.

Primary data was collected through personal interview.

Sampling Technique:-

Sr. No.	Sampling Procedures	
1	Sampling unit	Companies In Pune with annual turnover above Rs. 100 crore
2	Sample universe	All The Company
3	Sample design	Descriptive Research Design
4	Sample size	50 Company Clients

1.5 SIGNIFICANCE OF THE STUDY:

The result of this research would help the company to have a better understanding about the client's attitude towards facility services.

The study also enables the company to focus on the client's preferences and expectations regarding the services they offer.

2.1 INTRODUCTION TO ORGANIZATION:

The leading global, integrated security company, specializing in the provision of security services and solutions to customers and outsourcing the management of entire facilities to an organization that executes this service. Soft services include housekeeping, security, cleaning, catering, transportation, and front office management, etc. We have a team of professionally trained security personnel securing an impressive clientele which includes Diplomatic Missions, IT Industry, Multinational Companies, Hotels, Industrial Units, Airlines & Airports, Financial & Educational Institutions, Malls & Multiplexes, BPOs and many more. G4S provides smartly uniformed, professionally trained and well-supervised security officers who are responsible for security and safety of assets, personnel and property against loss due to theft, pilferage, intrusion, fire, flooding or an accident.G4S plc. (Formerly Group 4 Securicor) is a British multinational security company headquartered in Crawley, England.

The company was set up in 2004 when London-based Company Securicor amalgamated with Danish business Group 4 Falck. The Company offers a range of services, including the supply of security personnel, monitoring equipment, response units and secures prisoner transportation. G4S also works with governments overseas to deliver security.

2.1.1 BACKGROUND AND INCEPTION OF THE ORGANIZATION:

G4S was formed in July 2004, when Group 4 Falck's security business merged with Securicor to create Group 4 Securicor and began trading on both the London and Copenhagen Stock Exchanges. In 2005, Lars Johansen was succeeded as chief executive by Nick Buckles and, in 2006, the new G4S brand identity was rolled out across its business worldwide. In the same year, Alf Dutch-Pedersen succeeded Jorgen Philip- Sorensen to become the non-executive chairman of the business.

In 2006, 2007 and 2008, G4S was the subject of a global campaign by union workers alleging that its subsidiaries undermine labor and human rights standards. Some of these groups were organized under the banner of the SEIU-funded Focus on Group 4 Securicor. This group supported protests at Group 4 Securicor's annual general meeting in London in 2005.

The 2006, US State Department Report on Human Rights in Indonesia, released in March 2006, featured the ongoing dispute in Jakarta with Group4/Securicor. In July 2006, the Indonesian Securicor workers had a substantial win – but the campaigners continue to support other Group 4 Securicor workers. The company disputed these claims and pointed to its strong relationships with unions around the world, including the GMB in Britain. In March 2008, it was announced that G4S were taking over Scottish Rock Steady Group – who steward at major sporting and music events mostly in the UK. Rock Steady events have included Live8 concerts in London, Scottish FA Cup Final & the Festival. In April 2008, G4S acquired RONCO Consulting Corporation, one of the world's premier humanitarian and commercial mine action, ordnance disposal and security companies. In May 2008, G4S acquired Armor. GSL, a provider of outsourced justice services, was also acquired by G4S in May 2008. Also, in the same month, G4S acquired Serbian company Progard Securitas. In 2008, G4S also acquired Touchcom, Inc.

for US$23 million. Touchcom, Inc. is located in the Burlington/Bedford, Massachusetts, and area. The rebranding of Touchcom, Inc. to G4S was completed by 1 January 2012. In December 2008, G4S and UNI Global Union announced the launch of an Ethical Employment Partnership, which will drive improvements in standards across the global security industry. Simultaneous to this, G4S and the SEIU reached an agreement to end their long dispute and establish a framework to work together in the interest of employees.

In 2009, G4S continued to acquire companies: Secure Monde International Limited and Shire moor International Engineering Limited, together, the UK's leading specialist banknote and high security technical and commercial advisory companies; All Star International for $60 million, one of the premier facilities management and base operations support companies providing services to the US government; Adesta, US- based provider of integrated security systems and communication systems; and Hill & Associates Consultants Limited, Asia's leading provider of specialist risk-mitigation consulting services. The Västberga helicopter robbery occurred on 23 September 2009 at 05:15 CET when a G4S cash service depot was robbed in Vasteras in southern Stockholm, Sweden. In the autumn of 2009, G4S personnel in Australia went on strike, arguing that the company had subjected them to low pay and poor working conditions. The strike imperiled the operations of the court system in the state of Victoria. The guards provided entry-point screening for weapons and bombs in both the County Court and Magistrates Court, as well as additional security in the court rooms themselves.

On 22 July 2012, a contractor reported that a third of his expected staff had not turned up; instead, he was sent a group of mainly female, teenage students with minimal training, whom he turned away as he did not feel comfortable leaving them for night duties. On 8 August 2012, G4S announced that it had finally contracted enough employees to fully fulfill its contract for the Olympic Games. Although missing its initial target of 10,000, G4S announced the sending of 7,000 personnel each day to Olympic venues, in a way they felt would allow them to fully secure each venue.

Subsequent to the Olympics contract failures, the chief constables of Bedfordshire, Cambridge shire and Hertfordshire were to recommend abandoning outsourcing work to G4S. They were backed by Jim Paice, the agriculture minister and Conservative MP for South East Cambridge shire. Following the Olympic Games, G4S provided a donation of £2.5 million to military charities as a goodwill gesture. G4S is the world's leading global, integrated security company specializing in the delivery of security and related services to customers across sixcontinents.

Founded in 1989, G4S India is the leading security solutions group in the country. The company today has more than 135,000 employees with 7 Hubs and a strong network of over 131 Branches and Area Offices across India. Besides its core business of Secure Solutions, Facilities Management, and Security Systems, G4S offers a range of services including; Training, Event Security, Security Consultancy & Risk Management, Central Monitoring Services, Fire Audit, Recruitment & Placement and Garment/Uniform Manufacturing.

G4S is proud to have an impressive clientele in various sectors including business process outsourcing, retail, healthcare, infrastructure, IT, banking, diplomatic missions & embassies, residential, hospitality, communication, and aviation.G4S India offers a range of services which includes: Secure Solutions

- Secure Systems
- Facilities Management
- Garment Manufacturing
- Recruitment &Placement

As a worldwide security solutions provider, G4S operates in more than 100 countries. We manage a workforce of nearly 585,000 employees worldwide

2.1.2 OWNERSHIP PATTERN:

G4s Facility Services (India) Private Limited is a Private incorporated on 14 September 1981. It is classified as Non-govt. Company and is registered at registrar of Companies, Delhi.

Sr. no	Particulars/Details	Description
1.	Registration under the Registration Act, 1908	N/A
2.	Registration under partnership Act, 1932	N/A
3.	Registration under the Companies Act, 1956	CINU67120DL1999PTC102278
4.	Registration No. under the Delhi Shops & Establishment Act, 1954	2013014969
5.	Registration under the Factories Act (for PE)	N/A
6.	Registration No. of Employee ESI Act 1948	11000255630001000
7.	Registration under the Registration Act, 1908	N/A
8.	Registration under partnership Act, 1932	N/A

2.1.3 NATURE OF BUSINESS:

Nature of the business is facility service provider. It provides services the different type of companies, malls etc.G4s Facility Services (India) Private Limited is a Private incorporated and Non-govt. Company. They provide services and facilities like Housekeeping, Supervisors, Admin Receptionist Coordinator, Cook, Pantry Boy, Office Boy, Delivery Boy, Runner Boy, House Boy, and House Lady Etc. The Private incorporated owned managed and controlled by the members.

2.1.4 VISION MISSION AND QUALITY POLICY:

- **VISION:**

Vision is the ultimate goal of an organization. The Vision of G4S Secure Solutions (I) Pvt. Ltd

"To be recognized as the global leader in providing security solutions".

- **MISSION:**

The mission statement of the G4S Secure Solutions (I) Pvt Ltd **"To meet our customers security needs by providing integrated solutions, & by doing so, enhance our shareholder value".**

We believe our success will be based on the following guiding principles

1) Delivering innovative products &services.
2) Providing excellent customer service.
3) Having committed employees who are proud of our company.
4) Continuously improving the way we do things.
5) Making sound commercial decisions.

- **QUALITY POLICY:**

1) **G4S values:**

Values are the standards we set for ourselves and the culture of the organization is the way those values are reflected in our behaviors and actions.

2) **Integrity and Respect:**

Our business activities and relationships are built on trust, honesty and openness. We deliver on the promises we make and treat our colleagues, customers and those in our care with the utmost respect.

3) **Safety, Security and Service Excellence:**

We work in a safe way and take great care to protect our colleagues and customers from harm. We are experts in security and use that knowledge to protect our customers' most valuable assets. We are passionate about delivering high levels of customer service.

4) **Innovation and Teamwork:**

We invest in technology and best practice to improve continually our service offering. We challenge ourselves to find new ways of helping our customers. We work together as a team to achieve the best results for our customers and our business. Everyone has a valid opinion and their contribution is valued.

2.1.5 TYPES OF PRODUCT AND SERVICES:

Grade	Description	Designation
G1	Highly Skilled	Indirect.
G2	Skilled	Supervisors, Admin Receptionist, Coordinator, Cook.
G3	Semi-Skilled	Pantry Boy, Office Boy, Delivery Boy, Runner Boy.
G4	Unskilled	House Boy, House Lady.

G4S India currently provides the following services:

- **Soft facility solution**
  - Comprehensive cleaning services: manpower, material, machinery
  - Hospitality services: pantry management, guest house management
  - Relates services: deep cleaning, gardening and landscaping, pest control, façade, cleaning, event management

- **Engineering solution**
  - Preventive maintained
  - Heating, ventilation, air conditioning
  - Plumbing, carpentry
  - Annual maintained contract
  - Property management contract
  - Electromechanically solution

- **Corporate and Industrial Investigation**
  - Office assistance
  - Front office executives
  - Computer operators
  - Telethon operator
  - Mail room management solution

- **Last mile delivery solution**
  - Last mile delivery
  - Managing stores/warehouses

- **Telecom and utilities solution**
  - Tower infrastructure and management solution
  - Meter reading

- **Chauffer solution**
  - Personal chauffeurs
  - Parking management solution
  - Specialist vehicle chauffeurs
  - Heavy carriers chauffeurs
  - Strategic event

- **Fire and Safety Services**

2.2 MARKET SCENARIO:

G4S describes itself as "**the world's leading provider of security solutions**" and provides security services for over 40 embassies around the world, work as stewards at football stadiums and runs over six British prisons, operates prisoner tagging schemes, assists within the Government Communications Headquarters (GCHQ) in the United Kingdom, and provides administrative roles to the health and education sectors.

G4S controversies became known to the wider public following their handling of security for the 2012 Summer Olympics, but have been controversial since the 1990s, when it operated under the name Group 4. However, the corporation insists that the level of substantiated complaints was extremely low and they are of a minor nature.

2.2.1 AREA OF OPERATION-GLOBAL/NATIONAL/REGIONAL

The **G4 nations** comprising Brazil, Germany, India, and Japan are four countries which support each other's bids for permanent seats on the Nations Security. Unlike the G7, where the common denominator is the economy and long-term political motives, the G4s primary aim is the permanent member seats on the Security Council. Each of these four countries has figured among the elected non-permanent members of the council since the UN's establishment. Their economic and political influence has grown significantly in the last decades, reaching a scope comparable to the permanent members (P5). However, the G4S bids are often opposed by the Uniting for Consensus movement, and particularly their economic competitors or political rivals.

Organizations is working at-

- Global
- National
- Regional

2.2.2 COMPETITOR'S INFORMATION:

1. **ISS India Pvt.Ltd.**

   ISS is a leading global provider of facility services, offering services on international scale leverage knowledge and experiences. A set of specific corporate governance guidelines, policies and codes of conduct For the ISS group have been adopted and implemented by all regional and local entities. We believe in being compliant to all such policies

2. **SODEXO Facility Service (I) Pvt.Ltd.**

   Improving the quality if life isn't just a dream. For sodexo it's a mission. We believe Quality of life helps to keep people healthy, happy and motivated throughout life we believe it helps organizations to be more efficient and productive. For fiscal year 2010 (ending August 2009) revenues reached 15.3 billion Euros, with a market capitalization of 6.5 billion Euros. Revenues by region represent 38% in North America, 37% in Continental Europe, 8% in the UK and Ireland, and 17% elsewhere.

3 **JLLS Facility Service (I) Pvt.Ltd.**

   Jones Lang LaSalle Incorporated or JLL is a commercial real estate services firm. It is the second-largest company of its kind in the world, smaller only than CBRE Group. The company is ranked 189th on the Fortune 500. The company has been consistently named by the Ethisphare institute as one of the world's most ethical companies.

4 CBRE Facility Service (I) Pvt.Ltd.

CBRE Group, Inc., is an American commercial real estate services and investment firm. The abbreviation CBRE stands for Coldwell Banker Richard Ellis. As of 2018, it is the largest commercial real estate services company in the world.

CBRE offers facilities management; transactions management; project management; property management; investment management; appraisal and valuation; property leasing; strategic consulting; property sales; mortgage services and development services. It is based in Los Angeles, California, operates more than 480 offices worldwide, and serves clients in more than 100 countries.

The CBRE Global Investors subsidiary sponsors real estate investments via investment fund and direct investments that it manages. As of December 31, 2018, the division had US$105.5 billion in assets under management.

2.2.3:ACHIEVEMENT/AWARD:

- **2019:** Jim Mills (Project Vision- G4S)- Best Use of Technology The National Winners At The Annual British Security Awards 2019

- **2018:** G4S implements new global structure of three core service lines: Secure Solutions, Cash Solutions, and Care& Justice Services

- **2017:** G4S Africa awarded Top Employer are 13countries.

- **2012:** G4S acquires Chubb Emergency Response in the UK, providing key holding and response services. Also in the UK, the Lincolnshire Police Authority award G4S the first contract in the UK to build, design and staff a police station.

- **2011:** G4S awarded two prison contracts and three work programmed regions in the UK.

- **2006:** G4S wins Human Resources Excellence award for "Best Executive Development programmed".

2.3 VARIOUS DEPARTMENTS IN THEORGANIZATION:

1. Sales Department

The head of the sales department is known as sales manager and must have the following essential qualities:

(a) He must be a good judge of human nature, a good 'mixer' and have know-how to handle men.

ADVERTISEMENTS:

(b) He must be able to understand the psychology of the customers.

(c) He must be good organizer, otherwise he will unable to tackle the hard work required to utilize the full efforts of all representatives and agents, whom he must keep in close personal touch. They are the eyes and ears of the firm and their reports must be given weight age.

(d) He must call meetings of all representatives at regular intervals and instruct them about the latest sales position, policy and requirements.

(e) He must keep co-operation with all other departments.

Suspect, prospect, proposal, negotiation and control in facility management services follow this technique to identify their prospective clients and sale their product or services.

2. Operation Department

"Key areas and functions of operations management include value chain analysis, supply chain management, inventory management, scheduling, quality control and business process analysis (Schermerhorn, 2011)."

Operations management focuses on how organizations produce goods and services efficiently and effectively. It concerns the improvement of business operations and the transformation process through which goods and services are created

3. Human Resource Department:

Human resource management is the strategic approach to the effective management of people in a company or organization such that they help their business gain a competitive advantage. It is designed to maximize employee performance in service of an employer's strategic objectives.

4. Finance Department:

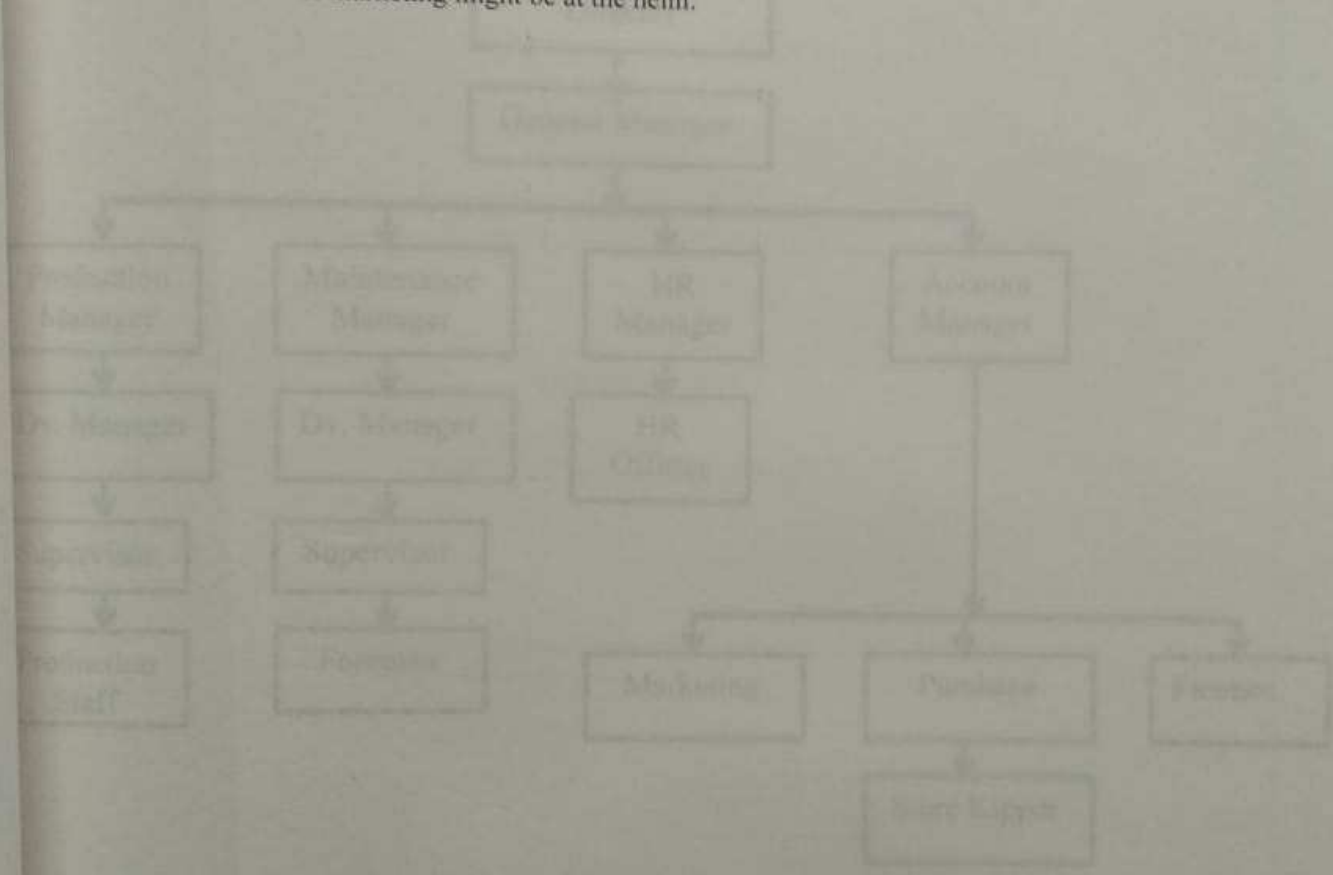
The part of an organization that manages its money. The business functions of a finance department typically include planning, organizing, auditing, accounting for and controlling its company's finances. The finance department also usually produces the company's financial statements.

5. Procurement Department:

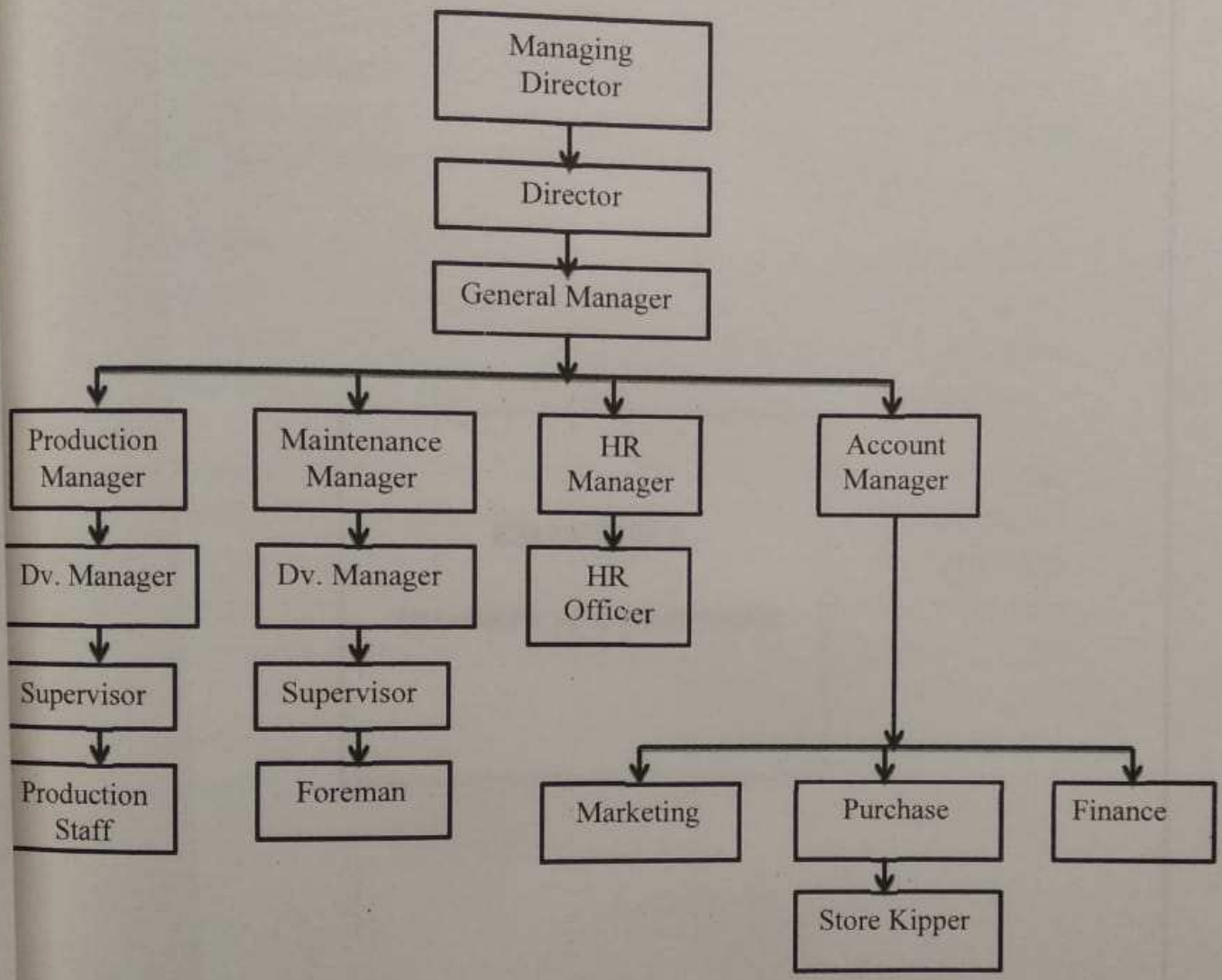
Procurement deals with the sourcing activities, negotiation and strategic selection of goods and services that are usually of importance to an organization. Purchasing is the process of how goods and services are ordered.

6. Marketing Department:

A marketing department promotes your business and drives sales of its products or services. It provides the necessary research to identify your target customers and other audiences. Depending on the company's hierarchical organization, a marketing director, manager or vice president of marketing might be at the helm.



2.4 ORGANIZATION CHART:



3.1 BRIEF REVIEW OF LITERATURE

A literature review is an evaluative report of information found in the literature related to your selected area of study. The review should describes, summaries, evaluates and clarifies this literature. It should give a theoretical base for the research and help you to determine the nature of your research. Works which are irrelevant should be discarded and those which are peripheral should be looked at critically.

A literature review is more than the search for information, and goes beyond being a descriptive annotated bibliography. All works included in the review must be read, evaluated and analyzed. Relationships between the literatures must also be identified and articulated, in relation to your field of research.

In writing the literature review, the purpose is to convey to the reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are. The literature review must be defined by a guiding concept (e.g. your research objective, the problem or issue you are discussing or your argumentative thesis). It is not just a descriptive list of the material available, or a set of summaries.

On the basis of review of literature, the following conclusions can be made regarding the relative amount of published research;

❖ **Nourse (1990)**

- Facility Management unit is seldom aware of the overall corporate strategic planning, does not have a bottom- lines emphasis.

❖ **Becker (1990)**

- Facility Management is responsible for co-coordinating all efforts related to planning, designing and managing buildings and their systems, equipment and furniture to enhance the organization's ability to compete successfully in a rapidly changing world.

❖ **Bernard, (1996)**

- Defines facilities as "the premises and services required to accommodate and facilitate business activity" .Bearing this in mind, to have any chance of being fully cost effective the management of facilities must directly embrace the three generic cost centers which includes premises, support services and information technology.

❖ **Alexander (1999)**

- The scope of discipline covers all aspects of property, space, environmental control, health and safety, and support services

❖ **Hinks and McNay (1999)**

- Common interpretations of the Facility Management remit: maintenance management; space management and accommodation standards; project management for new-build and alterations; the general premises management of the building stock; and the administration of associated support services.

❖ **varcoe (2000)**

- A focus on the management and delivery of the business "outputs" of both these entities the real estate and construction industry i.e. the productive use of building assets as workplaces.

❖ **Nutt (2000)**

- The primary function of Facility Management is resource management, at strategic and operational levels of support. Generic types of resource management central to the Facility Management function are the management of financial resources, physical resources, human resources, and the management of resources of information and knowledge.

❖ **IFMA (2003)**

- Facilities must be managed as an integrated system. The Integrated Facility Management Association defines facility management as the practices of coordinating the physical workplace with the people and work of the organization.

This paper identifies the determinants of perception of consumers in facilities management in India. The present study was carried out in South India. Since the main objective of the study was to identify the awareness and determinants of perception of consumer in the facilities management among the middle income groups in South India, we concentrated on the variables like the Acceptance of an independent FM service provider, Current Awareness of the people regarding FM services, Current Services, Criteria for Choosing, Locating Services Provider, Speed Obtaining Services, Monthly Maintains Services, Quality of Services Received, Reliability on Services Provider to keep up promises, etc in FM services. Using pretested structured questionnaire, the primary data have been collected purposively, by covering the wide range of Features, Characteristics, and Comments from the randomly chosen two- hundred respondents from the study area. We have applied statistical tools such as descriptive statistics along with regression analysis to identify the factors determining facilities management and awareness of the facilities management among the selected respondents. We found that 61.5 percent of the respondents have the perception of facilities management and 38.5 percent of the respondents are unaware of facilities management. The present paper concludes that the determinants of awareness of facilities management were Acceptance, Awareness, Current Services, Criteria for Choosing, Locating Services Provider, Speed Obtaining Services, Monthly Maintenance Expenses, Quality of Services Received, Reliability on Services Provider, etc in FM services are statistically Significant. The higher standard of living has positive relation to the awareness of facilities management.

Keywords: Facilities management (FM), Defect Liability Period (DLP), Awareness of facilities management, determinates of facilities management.

- INTERNATIONAL JOURNAL OF INTELLECTUAL PROPERTY RIGHTS (IJIPR)

Volume 5, Issue 1, January - June (2014), pp. 01-17

3.2 CONCEPTUAL FRAMEWORK:-

- **Customer Awareness:**

Introduction:-

Consumer Awareness is an act of making sure the buyer or consumer is aware of the information about products, goods, services, and consumers rights. Consumer awareness is important so that buyer can take the right decision and make the right choice. Consumers have the right to information, right to choose, right to safety. Consumer Awareness is the process of making the consumer of goods and services aware of his rights. It involves educating a consumer about safety, information and the redressed options available to him.

Definition:

"Consumer Awareness is an act of making sure the buyer or consumer is aware of the information about products, goods, services, and consumers rights. Consumer awareness is important so that buyer can take the right decision and make the right choice".

Customer awareness is a part of a company's marketing & communications plan. It is a process that helps an entrepreneur educates customers about his/her company, its performances and the products or services his/her company delivers. A well-designed awareness program ensures better customer engagement and protects consumer welfare.

Top Objectives of a Customer Awareness Program

- Understand which category of customers would be interested in the product or service you're planning to sell.
- Prepare an effective marketing and advertising plan to reach the target consumer segment.
- Help customers find out your products and services.
- Convey a clear message explaining the strengths and benefits of your products.
- Gain consumer's trust by helping them understand how the product will solve their respective problems.

How Important is Building a Smart Customer Awareness Program?

Today, a corporation operates in a highly competitive environment. If an entrepreneur wants its target consumers to know about its innovations and prioritize its products over the similar category products that its competitors sell, it has to build a good customer awareness process.

An entrepreneur needs a solid customer awareness plan to reach maximum numbers of potential customers and create a product demand. However, it will not happen if a company doesn't communicate with the customers effectively. When building customer awareness, a company has to put across its USP and solve the pain point of the customers.

Building customer awareness is important because consumers have a right to know why they should buy your product, what its benefits are and how safe it will be to use your product.

3 Steps to Building Customer Awareness:-

When building customer awareness, an entrepreneur determines his/her target market, uses a very specific marketing tool or channels to engage and communicate with the consumers and help them increase product and service knowledge. The three major steps that a customer awareness program includes can be explained as below –

1. In the first stage, a company creates awareness by pointing out the pain point of the customers. The company needs to talk more about the problem at this stage. The intention is to make consumers aware of the prevailing problem if they're not already. Raise awareness using a very logical message.

2. Give customers a solution to that problem in the second step. Get customer's attention by presenting your solution as the best way to solve the respective problem.

3. Present your product or brand as the best solution to the problem in the third stage. As the customers will know the problem they are facing by this time, it will be easy for them to understand that they can overcome the problem with the help of your brand.

Corporations Who Incorporate Customer Awareness

Ford's customer awareness program is the best example. To create awareness about the company's product quality, safety, social and environmental performance, the company engages into various two-way communications with the stakeholders and consumers. The company participates in stakeholder engagement forums.

Ford also uses other non-traditional marketing ideas to create awareness. They initiated a Drive One campaign in North American, which encouraged people to experience their vehicles firsthand and promoted the quality, safety, green technology and other smart features that their vehicles had. The motive of the campaign was to help consumers understand their product strength and thus increase the likelihood that they would buy it. So the bottom line is, a well-designed customer awareness program

Helps a company convey a clear message to its target customers, gain their trust by giving them accurate product information and create a market demand.

Need and importance of consumer awareness:-

It has been observed very often that a consumer does not get right goods and services. He is charged a very high price or adulterated or low quality goods are sold to him. Therefore it is necessary to make him aware. Following facts classify the need of making consumers aware:

- **To achieve maximum satisfaction:**
  The income of every individual is limited. He wants to buy maximum goods and services with his income. He gets full satisfaction only by this limited adjustment. Therefore it is necessary that he should get the goods which are measured appropriately and he should not be cheated in any way. For this he should be made aware.

- **Protection against exploitation:**
  Producers and sellers exploit the consumers in many ways as underweighting, taking more price than the market price, selling duplicate goods etc. Big companies through their advertisement also mislead the consumers. Consumer awareness shields them from the exploitation by producers and sellers.

- **Control over consumption of harmful goods:**
  There are several such goods available in market which cause harm to some consumers. For example we can take goods like cigarette, tobacco, liquor etc. The consumer education and awareness motivate people not to purchase such goods which are very harmful for them.

- **Motivation for saving:**

  The awareness controls people from wastage of money and extravagancy and inspire them to take right decision. Such consumers are not attracted by sale, concession, free gifts, attractive packing etc due to which people can use their income in a right way and can save money.

- **Knowledge regarding solution of problems:**

  The consumers are cheated due to illiteracy, innocence and lack of information. Therefore it becomes necessary that the information about their rights should be provided to them so that they cannot be cheated by producers and sellers. Through consumer awareness they are also made known to the proceedings of laws so that they can solve their problems.

- **Construction of healthy society:**

  Every member of the society is a consumer. So, if the consumer is aware and rationale, then complete society becomes healthy and alert towards their rights.

Rights of consumers:-

Consumers have the right to buy good commodities and services from the market. The protection of law has been provided to him so that producer or seller cannot cheat him in any way. Generally a consumer has got the following rights:

1. Right to safety: This is essential for producers that they should obey the rules related to the safety of consumers. The reason is if the producers do not obey safety rules then the consumer may have to bear a big risk. For example in pressure cooker there is a safety valve which if faulty can lead to a fatal accident. The manufacturers of the safety valves should fix a high quality for it. IF manufacturers do not do this then the consumers can take help of consumer's law.

2. Right to Choose: A consumer has the right to select any goods or services when he buys it. Suppose you purchase a gas connection and the gas dealer compels you to buy the burner also along with gas connection, but you want to buy gas connection only , and there is no requirement of the burner. In this situation your right to selection is not followed. The reason is that the seller pressurizes you to buy that thing which you do not want to buy. In this situation you can take legal action against the seller.

3. Right to be informed: When we purchase any product we see that some special information are written on the packet. Such as – batch number of the commodity, manufacturing date, expiry date, address of manufacturing company of the good etc. When we purchase any medicine, then we get the direction regarding the side effects and dangers of the medicines. When we purchase clothes, then we should have the washing directions. It is necessary to provide important information because consumers are given right to obtain information about things and services which they buy.

4. Right to information: In the year 2005, the government of India has made law known as right to information. The right to information law provides the right to get the information about all the activities of the government departments. The consumers also have right to get the consumers education.

5. Right to Redressal : The consumers have right to redressal against the not feasible bargaining and exploitation. The right to redressal can be understood by a single example. A man named Mathew got admitted in a private hospital for the removal of tonsils. An ENT surgeon operated for removal of tonsils under general anesthesia. Due to improper anesthesia, symptoms of mental imbalance developed in Mathew due to which he became handicap for the entire life. Consumer dispute redressal committee found the hospital guilty of negligence in the treatment and directed to pay the compensation. Thus, it is clear that if a consumer has to bear any loss, then on the basis of the quantity of loss, the consumer has right to get reprisal.

Consumer protection act:-

In 1986, the Consumer Protection Act was passed by the Government of India. The Consumer Protection Act is famous as COPRA. The main objective of this act is to decide the complaints of the consumers immediately and to make legal proceeding easy. A three tier judiciary system has been established under COPRA at district, state and national level to resolve the disputes of consumers. The court at district level hears the cases related to the claims up to Rs. 20 lakhs. The claims from Rs. 20 lakhs to Rs. 1 Crore are heard in the state level court. The court at national level hears the cases with the claims of more than 1 crore.

Willingness:-

When asked, most adolescents say they have no intention of engaging in behaviors that put their health at risk; and yet, when given the opportunity, many of them do (Gibbons, Gerrard, Reimer, & Pomery, in press). This is one reason why intentions are less effective at predicting adolescent behavior (Albarracin et al., 2001; Sheeran & Orbell, 1998), or behavior that involves health risk (Webb & Sheeran, in press).

In an effort to improve this type of prediction, Gibbons and Gerrard (1997; Gibbons, Gerrard, & Lane, 2003; in press) developed the prototype / willingness (prototype) model of health behavior. The basic contention of the model is that much health risk behavior (binge drinking, risky sex), especially among adolescents, is not intentional, but rather a reaction to social circumstances. To capture this unintentional, reactive component of risky behavior, Gibbons and Gerrard created the construct of behavioral willingness (BW), which they define as an openness to risk opportunity—what an individual would be willing to do under some circumstances. To assess BW (see Measures), risk-conducive situations are described, along with the qualifier that no assumptions are being made about whether the respondent.

Would ever be in (or seek out) these types of situations. The intent is to avoid implied internal attribution or "blame." After describing the situation, a series of possible responses is described, which increase in level of risk? The aggregated total provides an assessment of what kinds of risky behavior the respondent is capable of performing—if they encounter the opportunity.

BW is highly correlated with BI, but still consistently explains additional amounts of variance in behavior—from 2% to > 10% (sees Gibbons et al., 2003, for reviews). Moreover, as might be expected, BW is usually a better predictor than BI of health risk behavior for adolescents (Gerrard Gibbons, Stock, Dykstra, & Houlihan, 2005; Gibbons, Gerrard, Ouellette, & Burzette, 1998; Gibbons et al., 2004); then, with age and experience, BE and BI eventually exceed BW (Pomery, Gibbons, Gerrard, & Reis- Bergan, 2005). Nonetheless, there are certain risky behaviors that, for many people remain "opportunistic" throughout life—adultery, for example, or risky sex, drunk driving, or recreational drug use. Behavioral Intention vs. Behavioral Expectation vs. Behavioral Willingness Two important factors when deciding which measures to use in health research would be the type of behavior being examined and the age of the population being assessed. For health-promoting behaviors, such as those related to diet and nutrition, medical regimen, sun protection, exercise, etc., standard BI measures should work well, especially if accompanied by implementation intentions—where and when to exercise, which diet to follow, or which sunscreen to use. If the behaviors are complex and control is an issue, then these BI items should be accompanied by measures of perceived control. By the same token, if there is reason to believe that commitment to the intention or goal is tenuous, or if the behavior has a clear social

desirability element associated with it, or, again, if perceived (or actual) control is low, such as with weight loss or smoking cessation, then BE measures may do better than BI (it's not likely they will do worse). Finally, much health behavior research concerns health risk, which often has a significant "social reaction" component (Webb & Sheeran, in press)," especially for adolescents.

Performance of these behaviors often depends on the situation. The best way to assess these kinds of behaviors would be to use BW as well as BE measures, and, if possible, measures of intention to not engage in the behavior.

Why is willingness important?

Yes, willingness is very important. It can also be the difference in life or death. Your will is very powerful. It is a connection with the mind that changes things for the good or for the worse. It really just depends on how you use your will. Some people can will themselves well, just by the shear power of their beliefs. In the same token, people can will themselves dead because the power of their beliefs works in both directions, positive and negative.

Here is an example: If you tell yourself that you are going to be sick and you truly believe that you are going to be sick, then you unknowingly will place yourself in situations where you will begin to have sickness develop in your body. It could be a cold or something worse. Your mind is powerful and when you truly believe something, your mind will find a way to give you what you will it to. That's why positive thinking is always encouraged, simply because, you don't want to bring things into your life that you really don't want in your life. However, if what you don't want is all you talk about, then you will continue to get more and more of it, simply because you are giving power to what you don't want, instead of what you do want. Make sense?

Facility Management

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.

Facilities management as a profession should be used strategically to provide quality working environments. The available quality management and performance management techniques are reviewed, which can be applied to facilities management service providers where facilities management functions are outsourced.

It provides a case that performance management is an essential element of the tendering process and is necessary to enable continuous improvement in a climate of increasing competition among service providers, many of which have diversified into many different industry strands.

It is also argued that there should be a shift in outsourcing trends to an increased number of specialist service providers rather than the current predominant model of bundled services. Office design is also presented as a strategic tool in improving productivity and reducing absenteeism.

Facility management (FM) is a profession that encompasses multiple disciplines to ensure functionality, comfort, safety and efficiency of the built environment by integrating people, place, process and technology. The International Organization for Standardization defines Facility Management Services as the "organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business."Facility managers (FMs) can have many different titles and arrive in their profession through a variety of career paths. They're responsible for making sure systems of the built environment, or facility, work harmoniously.

Facility managers FMs contribute to the organization's bottom line through their responsibility for maintaining what is often an organization's largest and most valuable assets, such as property, buildings, equipment and other environments that house personnel, productivity, inventory and other important elements of operation.

Integrated management Definitions:-

There are many definitions for integrated management that you'll find below, but the common theme is a holistic, cross-functional management approach that brings to light the connectivity between humans, the economy and the environment. There is a growing trend towards the integrated approach that is being put into practice in organizations around the world.

This trend is also growing in business schools and management training programs as a way to ensure that the next generation of managers is equipped to capitalize on the opportunities that are revealed through an integrated approach.

This approach promotes creative thinking in students and provides them with the opportunity to learn how to leverage ESG data to optimize performance in any industry.

Sustainability is an essential benchmark for organizational decision-making and can be integrated into all functional areas of an organization, applied to traditional decision-making tools and levered as new a new assessment tool for decision-making. An Integrated Enterprise is one that incorporates decision-making tools such as Return on Integration, Integrated Rate of Return and Integrated Future Value into the organizational decision-making process.

Integrated management:-

Integrated management is a socially defined concept that is interpreted and understood in a variety of ways. It is however widely accepted as recognizing "nonlinear processes and connectivity between problems" in a managerial context.

Integrated management has been defined as encompassing the "effective direction of every aspect of an organization so that the needs and expectations of all stakeholders are equitably satisfied by the best use of all resources". Characteristics of integrated management are consensus-based decision-making, search for optimal efficiency and the co-existence of both uniformity and diversity within systems. This type of management is holistic and cross-disciplinary in its approach to balancing potential gains and losses. "Integrated management faces the tensions of different perspectives on value to formulate and implement strategies that transcend rather than accept trade-offs. It implies ensuring coherence among the various business functions as well as harmony between the organization, society, and the natural environment."

"Integrated management not only combines the efforts of individuals and groups in ways that achieve unity, but also unifies these efforts into a larger coherent whole."

Integrated Management "is the process of including Environmental, Social and Governance (ESG) performance in close coordination between business processes, functions, groups, organizations, and systems," which leads to value creation that cannot be attained through a traditional business model.

Health and safety

The facilities management department in an organization is required to control and manage many safety related issues. Failure to do so may lead to injury, loss of business, prosecution and insurance claims; the confidence of customers and investors in the business may also be shaken by adverse publicity.

Fire safety

The threat from fire carries one of the highest risks to loss of life, and the potential to damage or shut down a business. The facilities management department will have in place maintenance, inspection and testing for all of the fire safety equipment and systems, keeping records and certificates of compliance.

Security

Security to any organization is necessary to protect the employees and the business and this often comes under the control of the facilities management department, in particular the maintenance of the hardware. Manned guarding may be under the control of a separate department.

Maintenance, testing and inspection

Maintenance, testing and inspection schedules are required to ensure that the facility is operating safely and efficiently, to maximize the life of equipment and reduce the risk of failure. There are also statutory obligations to be met. The work is planned, often using a computer-aided facility management system.

Cleaning

Cleaning operations are often undertaken out of business hours, but provision may be made during times of occupations for the cleaning of toilets, replenishing consumables plus litter picking and reactive response. Cleaning is scheduled as a series of "periodic" tasks: daily, weekly, monthly, etc

Operational

The facilities management department has responsibilities for the day to day running of the building; these tasks may be outsourced or carried out by directly employed staff. This is a policy issue, but due to the immediacy of the response required in many of the activities involved the facilities manager will need to keep Tight control, often requiring daily reports or an escalation procedure some issues require more than just periodic maintenance, for example those that can stop or hamper the productivity of the business or that have safety implications.
Many of these are managed by the facilities management "help desk" that staff are able to be contacted either by telephone or email. The response to help desk calls are prioritized but may be as simple as too hot or too cold, lights not working, photocopier jammed, coffee spills, vending machine problems, etc.

Help desks may be used to book meeting rooms, car parking spaces and many other services, but this often depends on how the facilities department is organized. It may be split into two sections often referred to as "soft" and "hard" services. Soft would include reception, post room, cleaning, etc. and hard the mechanical and electrical services.

Tendering

The facilities management team will seek to periodically re-tender their contracts, or at the very least bench mark them to ensure they are getting value for money. For this to happen it is necessary to have an up to date list of equipment or assets to send out with the tenders. This information is often retained on the same computer as the maintenance schedule and updating may be overlooked as equipment gets changed, replaced or new items are installed. The asset register is also an important tool for budgeting, used to for life cycle costing and for capital expenditure forecasting.

Commercial property management

Building may be owned by the occupier or leased. Leased properties will be subject to periodic rent reviews.

Business continuity planning

All organizations should have in place a continuity plan so that in the event of a fire or major failure the business can recover quickly. In large organizations it may be that the staff moves to another site that has been set up to model the existing operation. The facilities management department would be one of the key players should it be necessary to move the business to a recovery site.

Space allocation and changes

In many organizations, office layouts are subject to frequent changes. This process is referred to as churn rate, expressed as the percentage of the staff moved during a year. These moves are normally planned by the facilities management department using computer-aided design. In addition to meeting the needs of the business, compliance with statutory requirements related to office layouts include: the minimum amount of space to be provided per staff member; fire safety arrangements; lighting levels; signage; ventilation; temperature control and welfare arrangements such as toilets and drinking water. Consideration may also be given to vending, catering or a place where staff can make a drink and take a break from their desk.

Europe

The European facility management association, Euro, uses the EN15221 definition. The definition of facility management, EN15221-1, provided by the European Committee for Standardization and ratified by 31 European countries is: "the integration of processes within an organization to maintain and develop the

agreed services which support and improve the effectiveness of its primary activities."

According to this European standard, the scope of FM is 'Space & Infrastructure' (planning, design, workplace, construction, lease, occupancy, maintenance, furniture, cleaning, etc.) and 'People & Organization' (catering, ICT, HRM, HS&S, accounting, marketing, hospitality, etc.).

Currently a project is underway to develop an ISO standard that defines Facility M on a global level. This project is being led by the British Standards Institute represented by Stan Mitchell, former chairman of BIFM and Global FM.

Perception Definition:-

"The process by which people translate sensory impression into a coherent and unified view of the world around them. Thought necessarily based on incomplete and unverified information, perception is equated with reality for most practice purpose and guides human behavior in general".

Perception:-

While our sensory receptors are constantly collecting information from the environment, it is ultimately how we interpret that information that affects how we interact with the world. Perception refers to the way sensory information is organized, interpreted, and consciously experienced. Perception involves both bottom-up and top-down processing. Bottom-up processing refers to the fact that perceptions are built from sensory input. On the other hand, how we interpret those sensations is influenced by our available knowledge, our experiences, and our thoughts. This is called top-down processing. One way to think of this concept is that sensation is a physical process, whereas perception is psychological. For example, upon walking into a kitchen and smelling the scent of baking cinnamon rolls, the sensation is the scent receptors detecting the odor of cinnamon, but the perception may be this smells like the bread Grandma used to bake when the family gathered for holidays. Although

our perceptions are built from sensations, not all sensations result in perception. In fact, we often don't perceive stimuli that remain relatively constant over prolonged periods of time.

This is known as sensory adaptation. Imagine entering a classroom with an old analog clock. Upon first entering the room, you can hear the ticking of the clock; as you begin to engage in conversation with classmates or listen to your professor greet the class, you are no longer aware of the ticking. The clock is still ticking, and that information is still affecting sensory receptors of the auditory system. The fact that you no longer perceive the sound demonstrates sensory adaptation and shows that while closely associated, sensation and perception are different.

There is another factor that affects sensation and perception: attention. Attention plays a significant role in determining what is sensed versus what is perceived. Imagine you are at a party full of music, chatter, and laughter. You get involved in an interesting conversation with a friend, and you tune out all the background noise. If someone interrupted you to ask what song had just finished playing, you would probably be unable to answer that question.

One of the most interesting demonstrations of how important attention is in determining our perception of the environment occurred in a famous study conducted by Daniel Simons and Christopher Chabris (1999). In this study, participants watched a video of people dressed in black and white passing basketballs. Participants were asked to count the number of times the team in white passed the ball. During the video, a person dressed in a black gorilla costume walks among the two teams. You would think that someone would notice the gorilla, right? Nearly half of the people who watched the video didn't notice the gorilla at all, despite the fact that he was clearly visible for nine seconds. Because participants were so focused on the number of times the white team was passing the ball, they completely tuned out other visual information. Failure to notice something that is completely visible because of a lack of attention is called **intentional blindness.**

In a similar experiment, researchers tested intentional blindness by asking participants to observe images moving across a computer screen. They were instructed to focus on either white or black objects, disregarding the other color. When a red cross passed across the screen, about one third of subjects did not notice it (Figure 1) (Most, Simons, Scholl, & Chabris, 2000).

DATA ANALYSIS AND INTERPRITATION

INTRODUCTION

Data analysis and interpretation is the process of assigning meaning to the collected information and determining the conclusions, significance and implications of the findings. It is an important and exciting step in the process of research. In all research Studies, analysis follows data collection.

According to C.R.Kothari (1989), "The term analysis refers to the computation of Measures along with searching for patterns of relationship that exist among data-groups". Analysis involves estimating the values of unknown parameters of the population and Testing of hypotheses for drawing inferences.

The aim of present study is to find out the "A study on awareness of integrated facility management services and willingness to consider availing such services."

The researcher collected
Data from 50 companies in Pune region their turnover was above 100 cr the
Collected data are arranged properly, analyzed systematically and interpreted precisely.

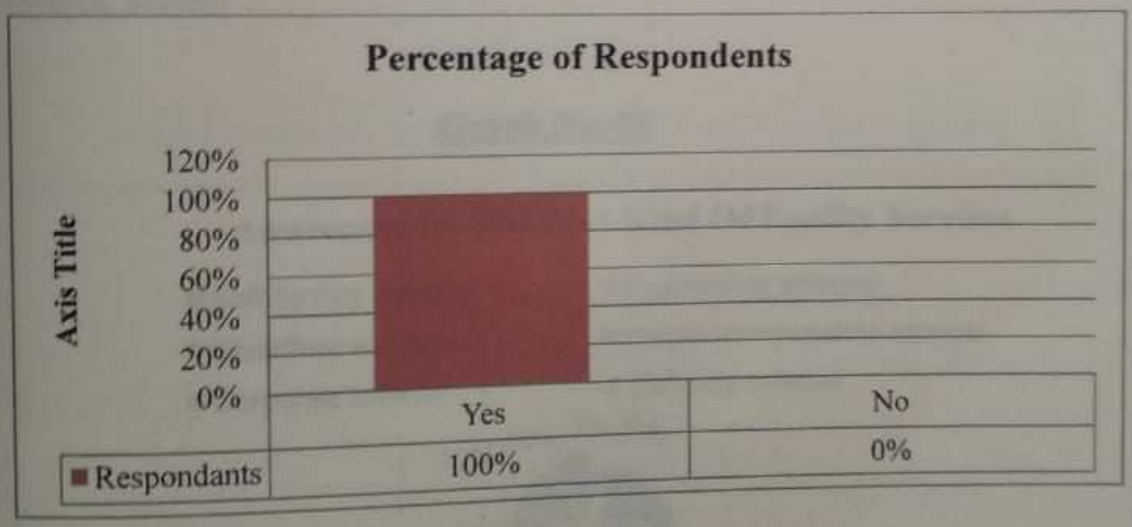
1. Are you aware of integrated facility management services?

Table No: 01

Particular	No. of Respondent	Percentage %
Yes	50	100
No	00	00
Total	**50**	**100**

(Source: Survey)

Graph No: 01



Interpretation:

From the above Graph and table Number_01 it can observed that 100% respondents are aware about integrated facility services.

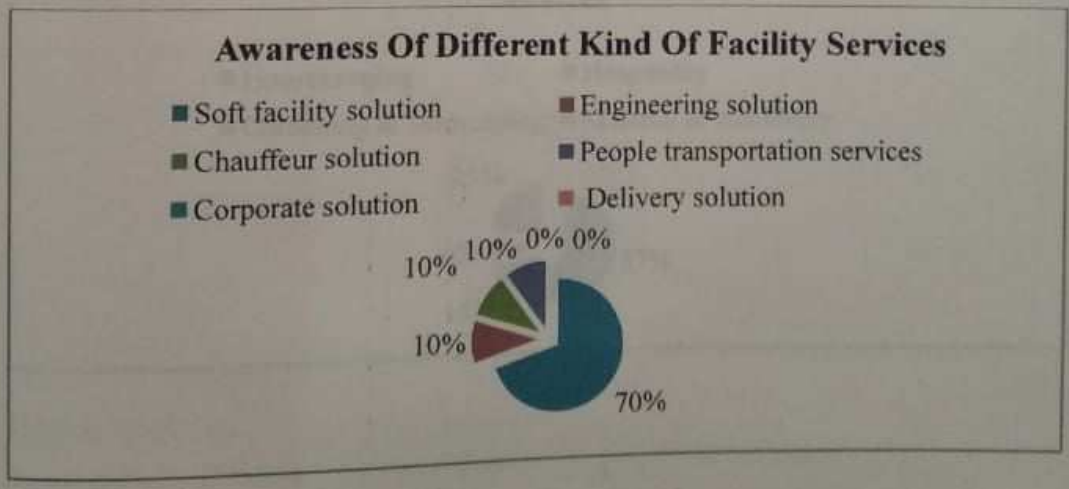
2. If yes, which kind of services are you aware of?

Table No: 02

Particular	No. of Respondent	Percentage %
Soft Facility Solution	35	70
Engineering Solution	05	10
Chauffeur Solution	05	10
People Transportation Services	05	10
Corporate Solution	00	00
Delivery Solution	00	00
Total	**50**	**100**

(Source: Survey)

Graph No: 02



Interpretation:

From the above Graph and table Number_02 it can be seen that 70% respondents are aware about soft facility solution, 10% engineering solution, 10% chauffer solution and 10% people transportation facilities.

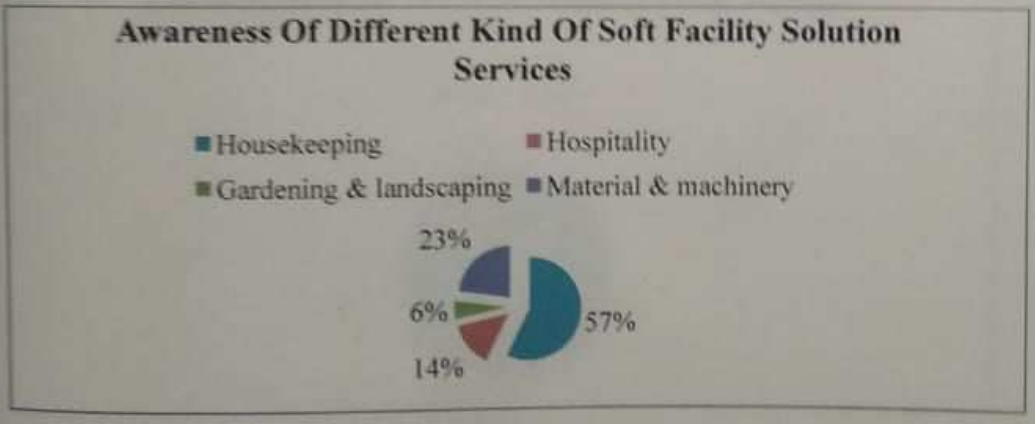
3. **Which kind of soft facility solution services are you aware of?**

Table No: 03

Particular	No. of Respondent	Percentage %
Housekeeping	20	57
Hospitality	05	14
Gardening and Landscaping	02	06
Material and Machinery	08	23
Total	**35**	**100**

(Source: Survey)

Graph No: 03



Interpretation:

From the above Graph and table number 03 it can be seen that 57% respondents are aware about Housekeeping, 14% hospitality, 6% gardening & landscaping & 23% material & machinery facilities.

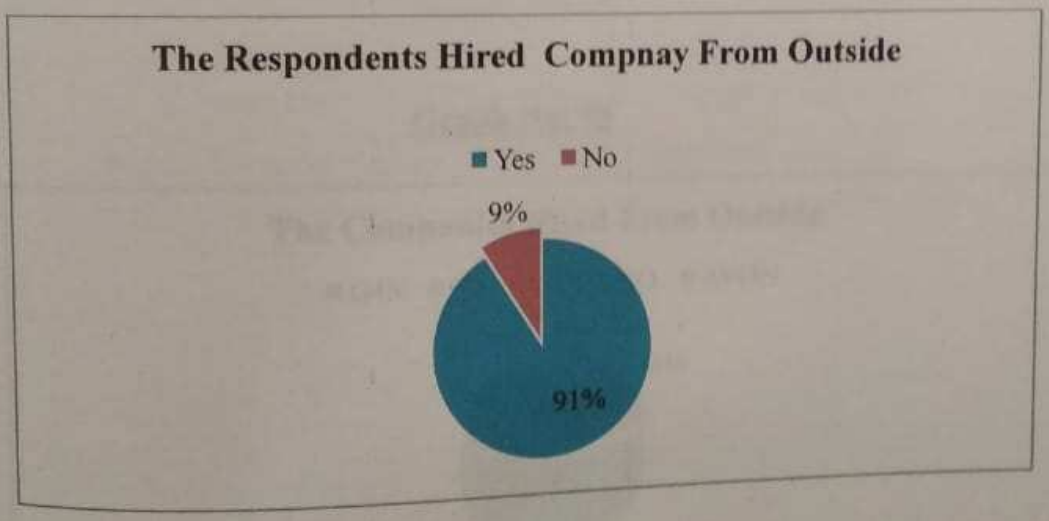
4. Have you hired any company to provide these services?

Table No: 04

Particular	No. of Respondent	Percentage %
Yes	32	91
No	3	09
Total	**35**	**100**

(Source: Survey)

Graph No: 04



Interpretation:

From the above Graph and table number_04 it can be seen that 91% respondents have hired company from outside to provide these services and 9% have not hired anyone from outside.

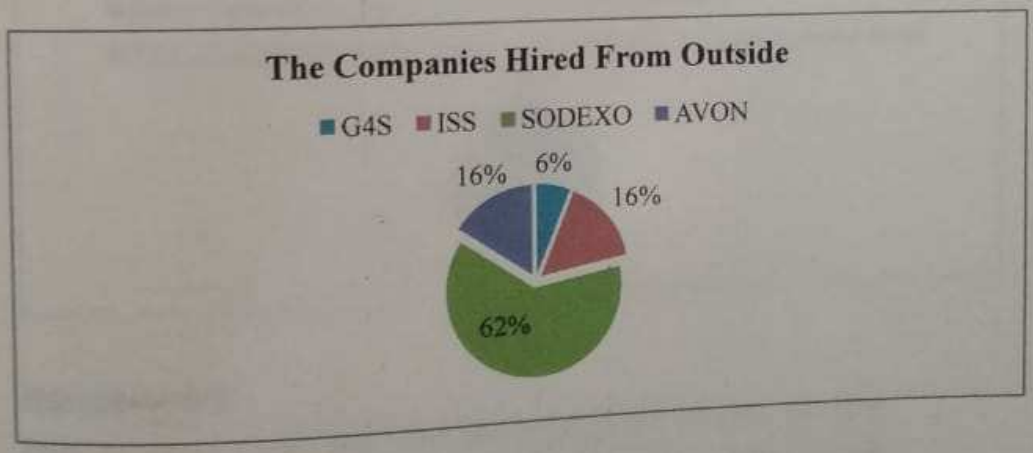
5. If yes, which company?

Table No: 05

Particular	No. of Respondent	Percentage %
G4S	02	06
ISS	05	16
SODEX	20	62
AVON	05	16
Total	**32**	**100**

(Source: Survey)

Graph No: 05



Interpretation:

From the above Graph and table number_05 it can be seen that 62% respondents hired the company SODEXO, 16% AVON, 16% ISS and 6% G4Sfacilities.

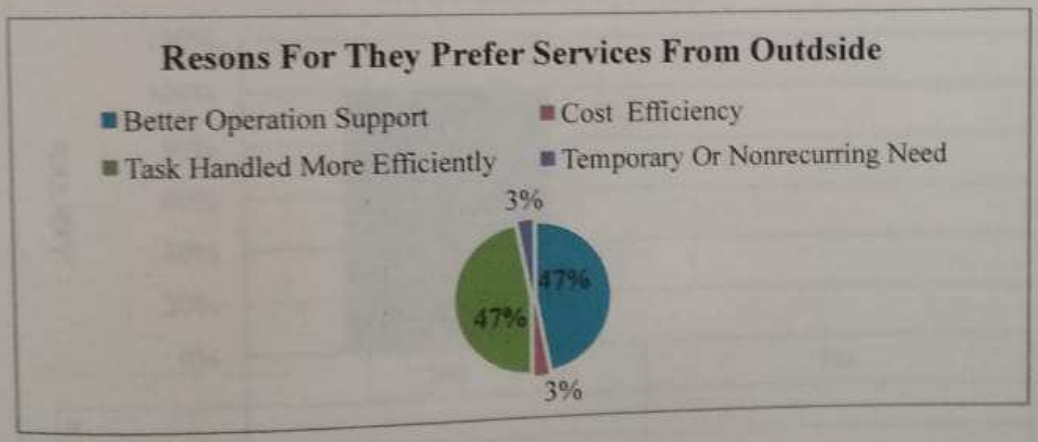
6. Why do you prefer these services from outside?

Table No: 06

Particular	No. of Respondent	Percentage %
Better Operation Support	15	47
Cost Efficiency	01	03
Task Handled More Efficiently	15	47
Temporary Or Nonrecurring Need	01	03
Total	**32**	**100**

(Source: Survey)

Graph No: 06



Interpretation:

From the above Graph and table number_06 it can be seen that 47% respondents prefer these services because of better operation support as well as 47% task handled more efficiently, 03% Cost efficiency, and 03% are temporary or nonrecurring need.

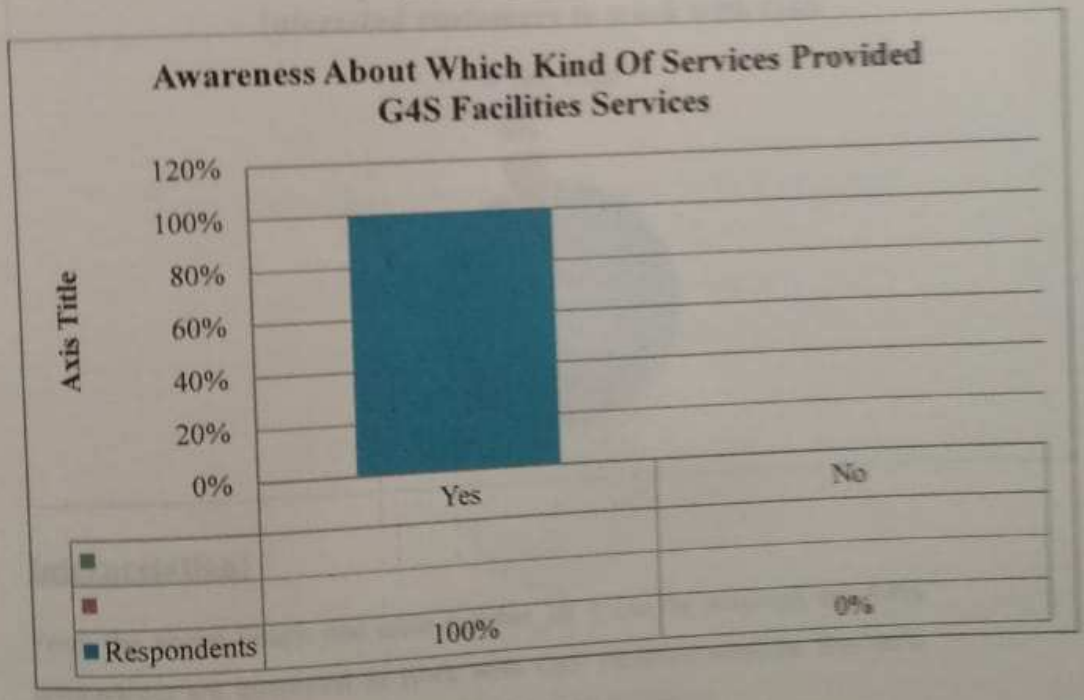
7. Do you know about the kind of services provided by G4S?

Table No: 07

Particular	No. of Respondent	Percentage %
Yes	32	100
No	00	00
Total	**32**	**100**

(Source: Survey)

Graph No: 07



Interpretation:

From the above Graph and table number_07 it can be seen that 100% respondents is aware about which kind of services provides G4S facilities.

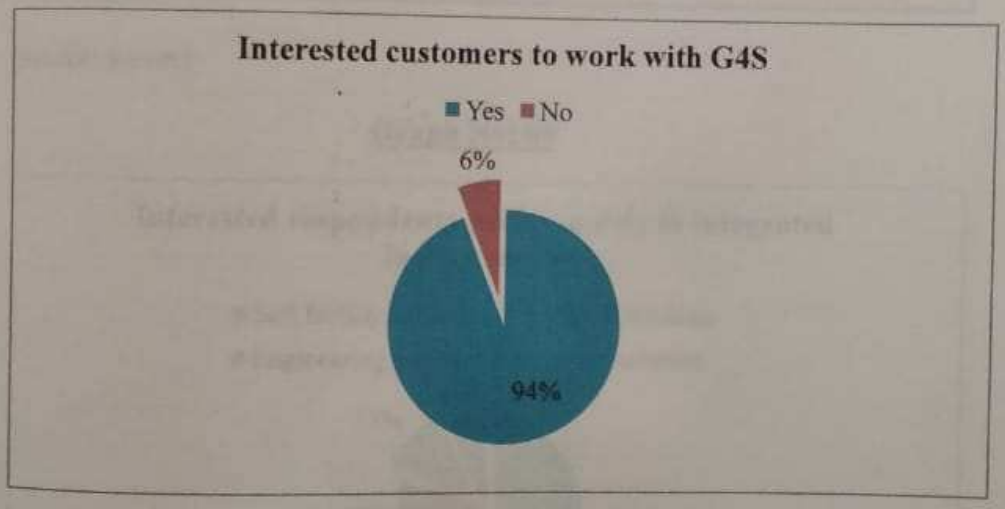
8. Are you interested to work with G4S?

Table No 08:

Particular	No. of Respondent	Percentage %
Yes	30	94
No	02	06
Total	**32**	**100**

(Source: Survey)

Graph No: 08



Interpretation:

From the above Graph and table number_08 it can be observed that 94% respondents are interested to work with G4S facilities services. But 06% respondents are not interested to work with G4S facilities.

9. If yes, which will you prefer?

Table No: 09

Particular	No. of Respondent	Percentage %
Soft Facility Solution	20	67
Transport Solution	04	13
Engineering Solution	04	13
Delivery Solution	02	7
Total	**30**	**100**

(Source: Survey)

Graph No: 09



Interpretation:

From the above Graph and table number_09 it can be seen that 67% respondents prefer soft facility solution, 13% prefer transportation solution also 13% prefer engineering solution and 7% respondents prefer delivery solution facilities.

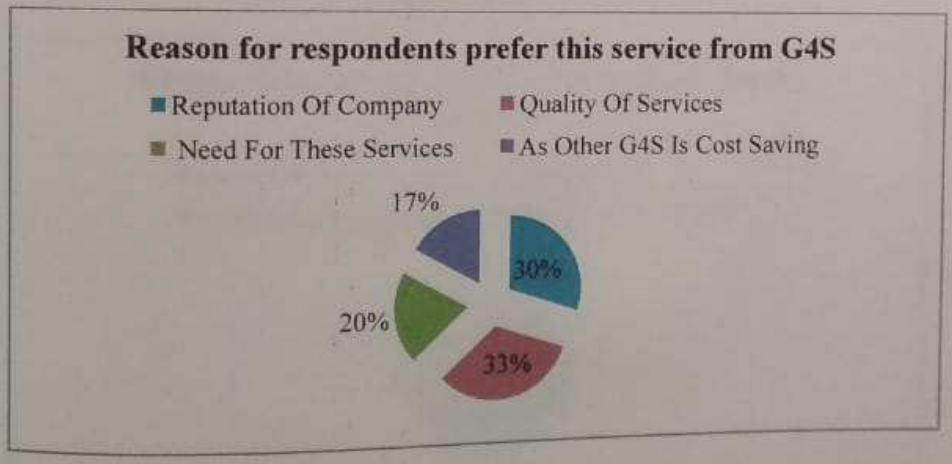
10. Why would you prefer these services from G4S?

Table No: 10

Particular	No. of Respondent	Percentage %
Reputation Of Company	09	30
Quality Of Services	10	33
Need For These Services	06	20
As Other G4S Is Cost Saving	05	17
Total	**30**	**100**

(Source: Survey)

Graph No:10



Interpretation:

From the above Graph and table number_10 it can observed that 33% would prefer because of quality services, 30% respondents prefer because of reputation of company, 20% need for these services and 17% respondents prefer as compare other G4S is cost saving facilities.

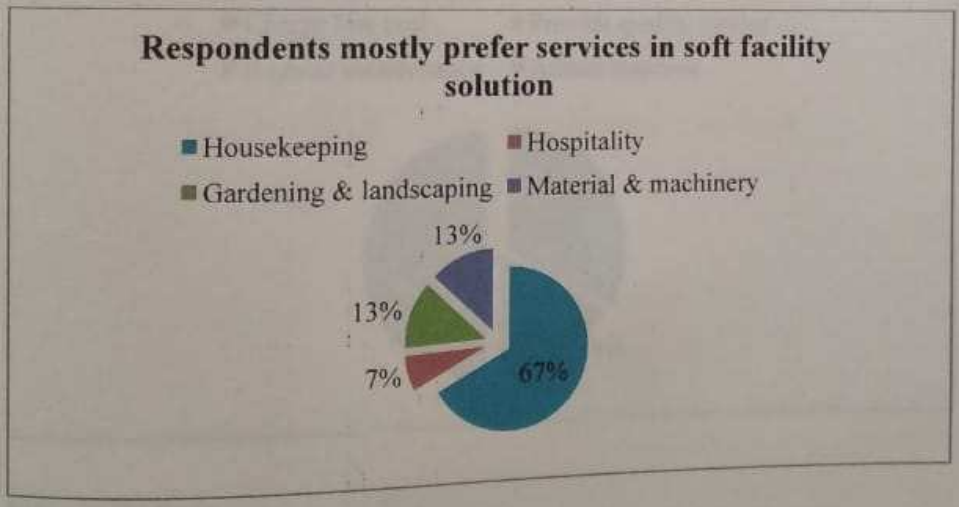
11. Which services you prefer mostly in soft solution?

Table No 11:

Particular	No. of Respondent	Percentage %
Housekeeping	20	67
Hospitality	02	07
Gardening and Landscaping	04	13
Material and Machinery	04	13
Total	**30**	**100**

(Source: Survey)

Graph No:11



Interpretation:

From the above Graph and table number_11 shows that 67% respondents mostly prefer housekeeping services, 13% respondents prefer gardening, landscaping, 13% respondents prefer material & machinery facilities and 07% hospitality services.

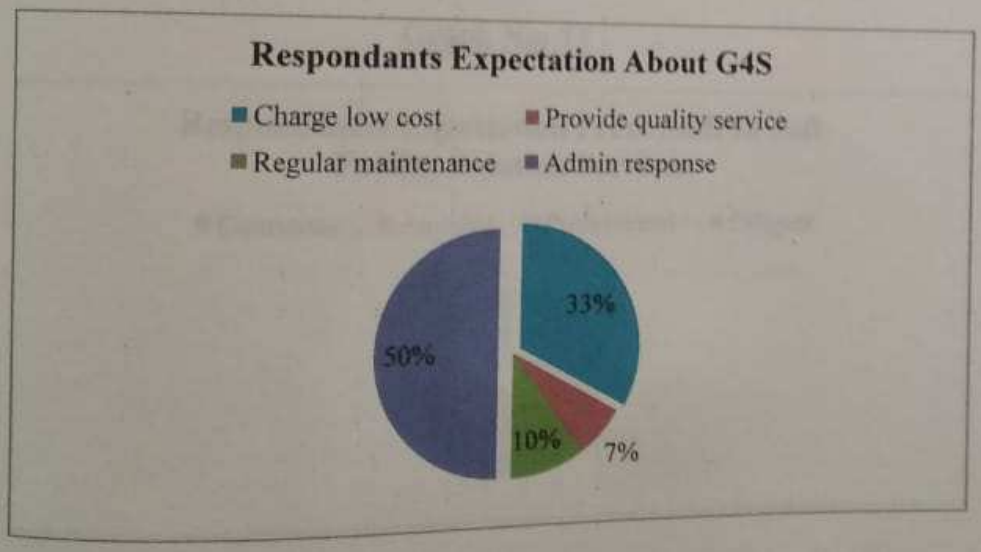
12. What are your expectations from G4S?

Table No12:

Particular	No. of Respondent	Percentage %
Charge low cost	10	33
Provide quality services	02	07
Regular maintenances	03	10
Admin response	15	50
Total	**30**	**100**

(Source: Survey)

Graph No:12



Interpretation:

From the above Graph and table number_12 it can be seen that 50% respondents expecting admin response, 33% respondents are expect charge low cost, 10% respondents expect regular maintenances and 07% respondents expect provide quality services.

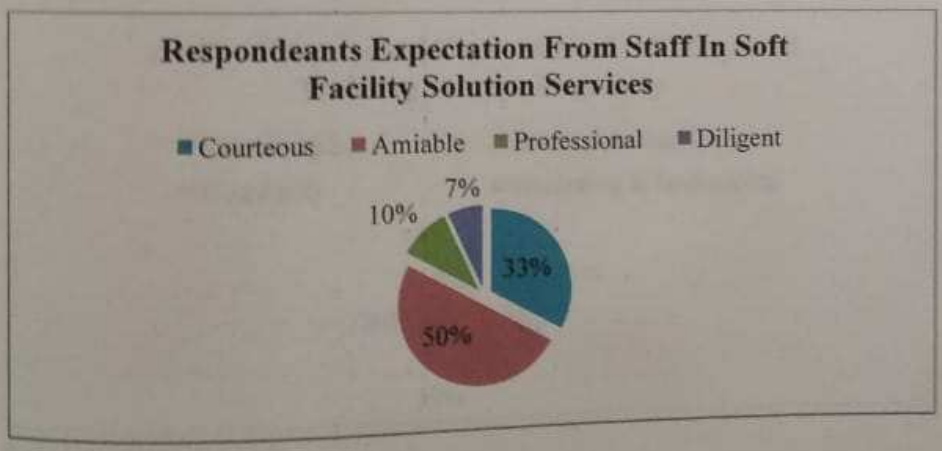
13. What do you expect from staff in soft facility solution?

Table No: 13:

Particular	No. of Respondent	Percentage %
Courteous	10	33
Amiable	15	50
Professional	03	10
Diligent	02	07
Total	**30**	**100**

(Source: Survey)

Graph No: 13



Interpretation:

From the above Graph and table number_13 it can seen that 50% respondents expect staff in soft facility solution to be amiable, 33% respondents expect staff in soft facility solution to be courteous, 10% respondents expect staff in soft facility solution to be professional and 07% respondents expect from staff in soft facility solution to be diligent.

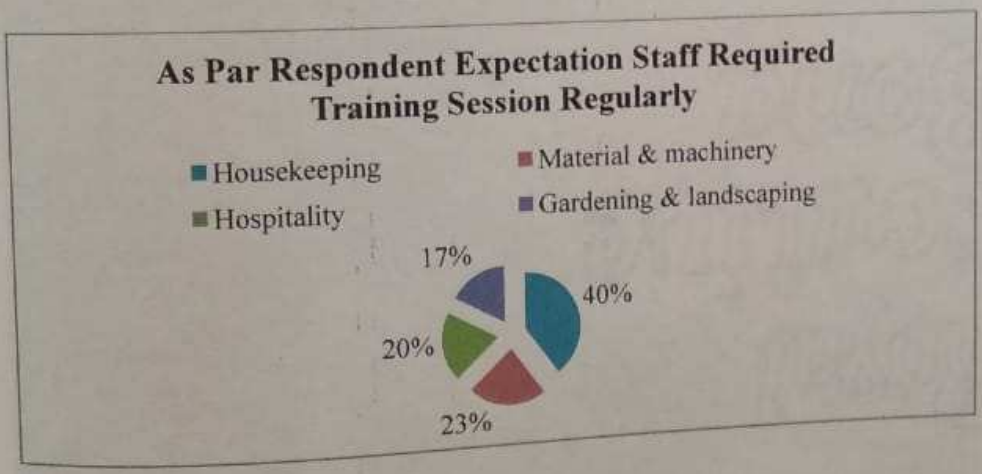
14. As per your expectations which staff required training session regularly?

Table No: 14:

Particular	No. of Respondent	Percentage %
Housekeeping	12	40
Material and Machinery	07	23
Hospitality	06	20
Gardening and Landscaping	05	17
Total	**30**	**100**

(Source: Survey)

Graph No: 14



Interpretation:

From the above Graph and table number_14 it can be observed that 40% respondents feel housekeeping required training session regularly, 23% respondents feel material and machinery required training session regularly, 20% respondents feel hospitality training session regularly and 17% respondents are feel gardening & landscaping required training session regularly.

A total of 173 companies were assigned to the researcher this companies were segmented on the basis of their annual turnover. Companies with turnover above 100cr were selected for the study. The total numbers of such companies identified were 50 and thus the sample size for the study was 50.

SR NO.	CUSTMER NAME	LOCATION
1	TCTS	ALANDI ROAD DIGHI
2	IBN TECHNOLOGIES LTD Pune	BIBWEWADI KONDHWA ROAD
3	HONEYWELL AUTONMATION INDIA LTD.PUNE INDIA	HADAPSAR
4	HINDUSTAN POLYMIDES & FIBER LIMITED	KOREGAON,PARK Pune
5	KEM HOSPITAL	RASTA PETH Pune
6	CHEMETALL	SANASWDI Pune
7	FOSECO INDIA LTD	SANASWDI Pune
8	JOHN DEERE EQUIPMENT PVT LTD	SANASWDI Pune
9	KUBOTO	SANASWDI Pune
10	ESSAR STEEL	SANASWDI Pune
11	ACG -WORLD	SHIRWAL
12	THERMAX	SHIVAJI NAGAR, Pune
13	QUICK HEAL TECH	YERWADA
14	NTT DATA	AUNDH Pune
15	VERITAS	BANER Pune
16	COTMAC ELECTRONICS PVT LTD	BHOSARI
17	AUTOLINE INDUSTRIES LTD	BHOSARI
18	TETRAPACK	CHAKAN
19	MAHINDRA AND MAHINDRA	CHAKAN
20	DOW	CHAKAN
21	TVS MOTORS(LOGISTICS)	CHAKAN
22	BRIDGESTONE	CHAKAN
23	MINDA STONE RIDGE INTRUMENT CORPORATION	CHAKAN
24	ADITY BIRLA MEMORIAL HOSPITAL	CHINCHWAD
25	EMERSONN	HINJAWADI
26	SAI LIFE SCIENCE/SAI ADVANTIUM PHARMA	HINJAWADI
27	TIETO SOFTWARE TECHNOLOGIES	KHARADI
28	BNY MELLON	MAGARPATTA

29	TERADATA	MAGARPATTA
30	AIR PRODUCT	MAGARPATTA
31	COCA COLA INDIA	PIRANGUT
32	SAHYADRI HOSPITAL	Pune
33	BAJAJ AUTO	AKURDI
34	APOLLO TYRES LTD	RANJANGAON
35	CUMMINS GENERATOR	RANJANGAON
36	SCHRADER DUNCAN LTD	RANJANGAON
37	NAINKO EXIM PVT LTD(BUILDING PRODUCT)	RANJANGAON
38	PEPSICO	RANJANGAON
49	WHIRLPOOR INDIA LIMITED	RANJANGAON
40	SUNGARD	SENAPATI BAPAT ROAD
41	FOTON MOTORS	VIMAN NAGAR
42	YAZAKI	WAGHOLI
43	SUN PHARMA (PHARMACEUTICAL)	AHMADNAGAR
44	SPJ EMBEDDED TECHNOLOGIES PVT LTD	BANER
45	BOSH Pune	CHAKAN
46	ZENSAR TECHNOLOGIES	KHARADI
47	QUALEX SYSTEM PRIVATE LIMITED,PUNE INDIA	KOTHRUD
48	XNET INC,PUNE INDIA	KOTHRUD
49	XANSA	MAGARPATTA
50	SYMENTECH (SOWTWARE COMPANY)	KHARADI Pune

CHAPTER 5 – FINDINGS:

1) It was seen that 100% customers are aware about integrated facility services.

2) It was found that 70% respondents are aware about soft facility solution, 10% engineering solution, 10% chauffer solution and 10% people transportation facilities.

3) It was seen that 57% respondents are aware about Housekeeping, 14% hospitality, 6% gardening & landscaping, 23% material & machinery facilities.

4) It was seen that 91% respondents have hired company from outside to provide services and 9% have not hired from outside.

5) It was found that 62% respondents hired the company SODEXO, 16% AVON, 16% ISS and 6% G4Sfacilities.

6) It was seen that 47% respondents prefer these services because they can provide better operation support as well as 47% because it can task handle more efficiently, 03% efficiency cost, and 03% are temporary or nonrecurring need.

7) It was seen that 100% respondents is aware about which kind of services provides G4S facilities

8) It was found that 94% respondents are interested to work with G4S facilities services. But 06% respondents are not interested to work with G4S facilities.

9) It was seen that 67% respondents prefer soft facility solution, 13% prefer transportation solution, 13% prefer engineering solution and 7% respondents prefer delivery solution facilities.

10) It was found that 33% would prefer G4S because of quality services, 30% respondents because of reputation of company, 20% due to need services and 17% respondents due is cost saving possible.

11) It can Seen that 67% respondents mostly prefer housekeeping services, 13% respondents prefer gardening, landscaping, 13% respondents prefer material & machinery facilities and 07% hospitality services.

12) It was found that in terms of expectation of G4S 50% respondents expecting admin response, 33% respondents expect low cost, 10% respondents expect regular maintenances and 07% respondents expect provide quality services.

13) In terms of expectations from staff in soft facility solution It can observe that 50% respondents expect them to be amiable, 33% respondents expect them to be courteous, 10% respondents them to be professional and 07% respondents them to be diligent.

14) In terms of training session for staff it was seen that 40% respondents are expecting housekeeping staff required training session regularly, 23% respondents expecting material and machinery staff required training session regularly, 20% respondents expecting hospitality staff training session regularly and 17% respondents are expecting gardening & landscaping staff required training session regularly.

SUGGESTIONS *OR* CONCLUSION:

SUGGESTIONS:

a) The awareness of the integrated facility management services is good, but soft facility Solution services still need awareness. Awareness creating activities to improve potential can be done through campaigns, advertising especially hospitality, landscaping & Gardening.

b) The organization must give due importance to consider factors such as:

- Cost of the services offered.
- Quality of the services offered.
- Consistency in providing the services.
- And the reliability of the services provider in keeping their promises.

CONCLUSION:

The study shows that the awareness of the soft facility services among the customer is very low as compare to other integrated services in Pune (Maharashtra) India. The market (facilities management services) segment is wide open and there are number of established facility management services providers in the city. If proper awareness is made then most of the customers are likely to accept this service if it is presented to them keeping in mind the easy accessibility, cost, quality, consistency and reliability in keeping the promises made with regard to facilities management services. When research conducted then analyze number of customer are interested to work with the G4S Facility services (I) ltd.

With all this we can conclude that this field is a budding field in Pune (Maharashtra) India and even in India itself. There is a great potential for this field to take the center stage very soon and it will also open employment opportunities in a large scale and also the standard of living of the people will further increase due to this kind of convenience enjoyed. And it will be the betterment of the country in all aspects.

ANNEXURE

ANNEXURE:

1. **Questionnaire**

Name of the company (Respondents):-

Age in years (Establishment):-

Contact number:-

Email_id:-

Which type of industry:-

Area of company:-

Turnover of company:-

Scale of company:-

1] Are you aware of integrated facility management services?

a] yes b] no

2] If yes, which kind of services are you aware of?

a] soft facility solution b] engineering solution

c] Chauffeur solution d] people transportation services

e] Corporate solution f] delivery solution

3] Which kind of soft facility solution services are you aware of?

a] Housekeeping b] hospitality

c] Gardening & landscaping d] material & machinery

4] Have you hired any company to provide these services?

a] Yes b] no

5] If yes, which company?

a] G4S
b] ISS
c] SODEXO
d] AVON

6] Why do you prefer these services from outside?

a] Better operation support
b] Cost Efficiency
c] Task handled more efficiently
d] Temporary or nonrecurring need

7] Do you known about the kind of services provided by G4S?

a] Yes
b] no

8] Are you interested to work with G4S?

a] Yes
b] no

9] If yes, which will you prefer?

a] Soft facility solution
b] transport solution
c] Engineering solution
d] delivery solution

10] Why would you prefer this service from G4S?

a] Reputation of company
b] Quality Of services
c] Need for these services
d] As others G4S is cost saving

11] Which service you prefer mostly in soft solution?

a] Housekeeping
b] hospitality
c] Gardening & landscaping
d] material & machinery

12] What are your expectations from G4S?

a] charge low cost
b] provide quality service
c] Regular maintenance
d] admin response

13] What do you expect from staff in soft solution?

a] Courteous
b] amiable
c] Professional
d] diligent

14] As per your expectations which staff required training session regularly?

a] Housekeeping
b] material & machinery
b] Hospitality
c] Gardening & landscaping

2. List of Companies:

SR NO.	CUSTMER NAME	LOCATION
1	AMCOR REGID PLASTICS	HADAPSAR
2	TCTS	ALANDI ROAD DIGHI
3	IBN TECHNOLOGIES LTD PUNE	BIBWEWADI KONDHWA ROAD
4	BLUE CODE CORPORATION, PUNE	CHANDAN NAGAR
5	TATA GREEN BATRIES LTD	LOW COLLAGE ROAD
6	SERUM INSTITUTE	HADAPSAR
7	HONEYWELL AUTONMATION INDIA LTD,PUNE INDIA	HADAPSAR
8	LBM INDIA PVT LTD	HADAPSAR
9	TATA CUNSULTANCY SERVICES TCS Pune	HADAPSAR
10	TECH MAHINDRA LTD, Pune	KARVE NAGAR
11	GREAT WALL MOTOR	KHED
12	HINDUSTAN POLYMIDES & FIBER LIMITED	KOREGAON,PARK Pune
13	SOHAN HELTHCARE PVT LTD	KOTHRUD
14	RELIANCE GLYCOL DIVISION	KOTHRUD
15	CIPLA PHARMACEUTICALS	KOTHRUD
16	TRB GLOBLE	SANSAWADI
17	KEM HOSPITAL	RASTA PETH Pune
18	CHEMETALL	SANASWDI Pune
19	CRAFTSMAN AUTOMATIOAN PVT LTD	SANASWDI Pune
20	DB SHANKER	SANASWDI Pune
21	ENKEI WHEELS INDAI LTD	SANASWDI Pune
22	FOSECO INDIA LTD	SANASWDI Pune
23	FUJIFILM SERICOL INDIA LIMITED	SANASWDI Pune

24	JOHN DEERE EQUIPMENT PVT LTD	SANASWDI Pune
25	BHARAT FORGE	SANASWDI Pune
26	KUBOTO	SANASWDI Pune
27	SANDEN VIKAS INDIA LTD	SANASWDI Pune
28	ESSAR STEEL	SANASWDI Pune
29	ACG –WORLD	SHIRWAL
30	TATA BLUECSOPE STEEL	SHIVAJI NAGAR, Pune
31	THERMAX	SHIVAJI NAGAR, Pune
32	CMC	SHIVAJI NAGAR, Pune
33	RELIGARE	SHIVAJI NAGAR, Pune
34	QUICK HEAL TECH	YERWADA
35	SONATA INFORMATION TECHNOLOGY LTD	AUNDH Pune
36	CONVERGYS	AUNDH Pune
37	NTT DATA	AUNDH Pune
38	FUTURISM TECHNOLOGIES PVT LTD	BANER Pune
39	BEKART INDUSTRIES PVT LTD	BANER Pune
40	VERITAS	BANER Pune
41	ALFA LEVAL	BANER Pune
42	PRAJ INDUSTRIES	BHAVDAN
43	COTMAC ELECTRONICS PVT LTD	BHOSARI
44	CENTURY ENKA LTD	BHOSARI
45	AUTOLINE INDUSTRIES LTD	BHOSARI
46	INDUS INTERNATIONAL SCHOOL	BHUKUM PUNE MULSHI
47	LEAR AUTOMOTIVE INDIA PVT LTD	CHAKAN
48	SUZLON ENERGY LTD	CHAKAN
49	TETRAPACK	CHAKAN
50	ENDURANCE TECHNOLOGY	CHAKAN
51	GE INDIA	CHAKAN
52	SPICER INDIA LTD	CHAKAN
53	MAHINDRA AND MAHINDRA	CHAKAN
54	MERCEDEZ BENZ	CHAKAN
55	COGEME PRECISIONS PARTS	CHAKAN
56	RACOLD	CHAKAN
57	SIGMA ELECTRIC	CHAKAN
58	HYUNDAI CONSTRUCTION EQUIPMENT	CHAKAN
59	DOW	CHAKAN
60	INTEVA PRODUCTS	CHAKAN
61	STANLEY BLACK & DECKER INDIA LIMITED	CHAKAN
62	VOLTAS	CHAKAN
63	SEMCO ELECTRONIC PVT LTD	CHAKAN

64	TVS MOTORS(LOGISTICS)	CHAKAN
65	ABIL	CHAKAN
66	AMFORGE INDUSTRIES LTD	CHAKAN
67	TVS MOTORS(LUCAS)	CHAKAN
68	ATLAS COPCO INDIA LTD	CHAKAN
69	CRONING INCORPORATED	CHAKAN
70	SHRDHA MOTORS	CHAKAN
71	A.RAYMOND	CHAKAN
72	BRIDGESTONE	CHAKAN
73	SUZLER	CHAKAN
74	MINDA STONE RIDGE INTRUMENT CORPORATION	CHAKAN
75	MAHINDRA NAVISTAR	CHAKAN
76	SKF INDIA LIMITED	CHINCHWAD
77	LUMAX INDUSTRIES	CHINCHWAD
78	HINDUSTAN ANTIBIOTIOCS	CHINCHWAD
79	ADITY BIRLA MEMORIAL HOSPITAL	CHINCHWAD
80	NIRAMAYA HOSPITAL	CHINCHWAD
81	ATLAS COPCO INDIA LTD	DAPODI
82	SANNDVIK ASIA PVT LTD	DAPODI
83	FABTECH PROJECT & ENGINEERING LTD	DAPODI
84	EMERSONN	HINJAWADI
85	SAI LIFE SCIENCE/SAI ADVANTIUM PHARMA	HINJAWADI
86	SQL INDIA INFOSYSTEM	HINJAWADI
87	INFOSYS	HINJAWADI
88	HSBC SOFTWARE DEVLOPMENT	KALYANI NAGAR
89	TIETO SOFTWARE TECHNOLOGIES	KHARADI
90	EATON	KHARADI
91	MPHASIS	MAGARPATTA
92	BNY MELLON	MAGARPATTA
93	ACCENTURE	MAGARPATTA
94	CAPITA	MAGARPATTA
95	JOHNDEERE	MAGARPATTA
96	DAR AL HANDASAH	MAGARPATTA
97	TERADATA	MAGARPATTA
98	ITC	MAGARPATTA
99	STERLITE	MAGARPATTA
100	REGUS	MAGARPATTA
101	EXL	MAGARPATTA
102	AVAYA	MAGARPATTA
103	AMDOCS	

145	E & Y	YERWADA
146	COMPULINK(INDIA)	HINJWADI
147	SUN PHARMA (PHARMACEUTICAL)	AHMADNAGAR
148	RATHI TRANSPOWER	AUNDH
149	CASH TECH SOLUTION INDIAPVT LTD	AUNDH
150	INTELEMENT TECHNOLOGIES LIMITED	AUNDH
151	SQTL INTEGRETED SOLUTION PVT LTD	AUNDH
152	CALIBRE MINDWARE PROGRAMING PVT LTD,PUNE INDIA	BANER
153	SPJ EMBEDDED TECHNOLOGIES PVT LTD	BANER
154	SURVIK SOFTWARE LTD	BANER
155	POLY RUB	CHAKAN
156	DREAM PLAST	CHAKAN
157	BOSH Pune	CHAKAN
158	PERSISTENT	ERANDWANE
159	XTREM INFO SYSTEM	FURSUNGI
160	KNORBROMSE	HINJWADI
161	NEWTON SOFTWARE PVT LTD,PUNE	KARVE NAGAR
162	ZENSAR TECHNOLOGIES	KHARADI
163	PRECISION TECHNICAL ANALYSIS PVT LTD Pune	KOTHRUD
164	QUALEX SYSTEM PRIVATE LIMITED,PUNE INDIA	KOTHRUD
165	TECHVIEW WEB SOLUTION PVT LTD,Pune	KOTHRUD
166	WORLDWIDE INFOSOFT SERVICES PVT LTD	KOTHRUD
167	XNET INC,PUNE INDIA	KOTHRUD
168	ZENSOFT SERVICES PVT LTD,PUNE	KOTHRUD
169	ZANSA	MAGARPATTA
170	PATNI	MAGARPATTA
171	VISHAY	MAGARPATTA
172	ZS ASSOCIATES	KHARADI Pune
173	SYMENTECH (SOWTWARE COMPANY)	

104	AIR PRODUCT	MAGARPATTA
105	THYSSENKRUPPINDIA	PIMPRI
106	FINOLEX CABLES LTD	PIMPRI
107	DATWLYER	PIRANGUT
108	COCA COLA INDIA	PIRANGUT
109	PRICOL	PIRANGUT
110	SAHYADRI HOSPITAL	Pune
111	GODREJ PROPERTIES LTD	Pune
112	BAJAJ AUTO	AKURDI
113	SUDARSHAN AUTO INDUSTRIES	Pune
114	APOLLO TYRES LTD	RANJANGAON
115	DAW CORNING	RANJANGAON
116	SWAROVSKI	RANJANGAON
117	LG INDI PVT LTD	RANJANGAON
118	CUMMINS GENERATOR	RANJANGAON
119	BOMBAY DEYING	RANJANGAON
120	HAIER APPLIANCES	RANJANGAON
121	SCHRADER DUNCAN LTD	RANJANGAON
122	KFLEX INDIA PVT LTD	RANJANGAON
123	MAKINO INDIA LTD	RANJANGAON
124	CUMMINS GENERATOR TECHNOLOGIES	RANJANGAON
125	GRUPO ANTOLIN(AUTOMOTIVE)	RANJANGAON
126	NAINKO EXIM PVT LTD(BUILDING PRODUCT)	RANJANGAON
127	TATA DISTRIBUTION COMPANY	RANJANGAON
128	PEPSICO	RANJANGAON
129	SCA	RANJANGAON
130	BAJAJ ELECRICALS	RANJANGAON
131	WHIRLPOOR INDIA LIMITED	RANJANGAON
132	AVERY DIMENSION	RANJANGAON
133	SLG GROUP	SB ROAD
134	COGNIZENT TECHNOLOGY	SB ROAD
135	DELOITTE	SENAPATI BAPAT ROAD
136	SUNGARD	VIMAN NAGAR
137	GALLAGHER	VIMAN NAGAR
138	FOTON MOTORS	VIMAN NAGAR
139	INFOBEANS	VIMAN NAGAR
140	ORIENTAL RUBBERS	VIMAN NAGAR
141	CHRYSLER	WAGHOLI
142	YAZAKI	WAGHOLI
143	DANFOSS	WAGHOLI
144	INTERVET PVT LTD	

BIBLIOGRAPHY

BIBLIOGRAPHY:

- **BOOKS REFERENCES:**

Books:

[1] C.R. Kothari, Research Methodology – Methods and Techniques (Second Edition), New age international (P) ltd, publisher

[2] Suja R.Nair Consumer behavior and marketing research 2005, Himalaya publishing House

[3] Hawkins best coneyConsumer behavior marketing strategy, TATA McGraw-Hill

[4] Richard B Chare, Nithin K Agarwal Operation Management for competitive Advantage, TATA McGraw-Hill

[5] The Complete Guide to Facility Management Paperback – 31 Aug 2017 By Dan Lowry (Author)

Literature review refers:

[1] INTERNATIONAL JOURNAL OF INTELLECTUAL PROPERTY

1. RIGHTS (IJIPR)
2. -Volume 5, Issue 1, January - June (2014), pp. 01-17

[2] "A case Study on Consumer Buying Behavior and Brand Loyalty with regard to Processed, Liquid Milk in Gauhati, Assam", Indian Journal of Marketing, Vol. 41, Number.5 Issue: May 2011.

[3] Encon Y.Y. Hui and Albert H.C. Tsang (2004): Sourcing strategies of facilities Management Journal of Quality in Maintenance Engineering Volume 10 · Number 2· 2004 · pp. 85-92.

[4] Dr.V.Antony Joe Raja, "Emerging Trends in Human Resource Management with Special Focus on Outsourcing in Various Sectors", International Journal of Management (IJM), Volume 3, Issue 1, 2012, pp. 197 - 204, ISSN Print: 0976-6502, ISSN Online: 0976-6510.

[5] Dr.V.Antony Joe Raja, "World Market Statistical Survey in Stakeholders: International Level Enhancing Business Efficiency Through Company Ethical Behavior", International Journal of Advanced Research in Management (IJARM), Volume 5, Issue 1, 2014, pp. 23 - 30. ISSN Print: 0976 – 6324, ISSN Online: 0976 – 6332.

[6] Anssi Salonen (2004): Managing outsourced support services: observations from case Study Volume 22 · Number 11/12 · 2004 · pp. 317-322.

[7] Edward Sullivan (2005): Building Operating Management, p 27-30.

[8] Dr. V.Antony Joe Raja, "The Study of E-Commerce Service Systems in Global Viral Marketing Strategy" International Journal of Marketing & Human Resource Management (IJMHRM), Volume 3, Issue 1, 2012, pp. 9 - 18, ISSN Print: 0976 – 6421, ISSN Online: 0976- 643X.

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1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: M.Tech. Mechanical- Design Engineering Programme Code: 1-1408968333			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Dissertation Phase I : Synopsis Submission Seminar	Dissertation	08
2.	Dissertation Phase II : Progress Seminar	Dissertation	06
3.	Dissertation Phase III : Progress Report presentation and submission		
4.	Dissertation Phase IV : Final presentation and submission of report		
5.	Dissertation Viva voce		

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College of Engineering
PANDHARPUR

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केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)
दुरध्वनी : ०२१७-२७४४७७१/७२/७३/ (११ लाईन्स), फॅक्स : ०२१७-२३५१३०
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Ph.D Research Section विस्तारीत क्रमांक - १२३ , १२४, १२५

Ref No. PAHSUS/ARD/Ph.D.-I/2019/ 8148 **Date:** 23 OCT 2019

To,
The Principal,
SVERI's College of Engineering, Pandharpur,
Tal-Pandharpur, Dist-Solapur-413304.

Subject :- Approval of M.E./M.Tech. Mechanical Engineering Dissertation Title.
Reference :- RRC Meeting Dated 27/09/2019

Sir/Madam,

With reference to above Subject, I am directed to inform you that, Research & Recognition Committee has accorded approval to the title of **M.E./M.Tech. Mechanical Engineering** Dissertation, as mentioned overleaf.

You are requested to bring the approval to the notice of concerned guide and students.

Thanking you.

Yours Faithfully,

(Assistant Registrar)
Research Development (Ph.D.-I)

College of Engineering
Pandharpur,
Inward No. 897
Date - 06/11/2019

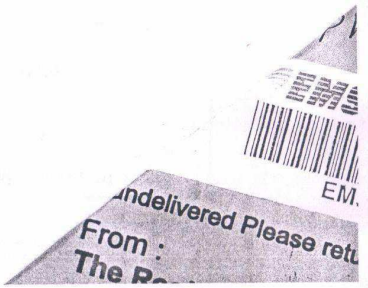
Copy to :-
The Director,
Board of Examinations and Evaluation,
P.A.H., Solapur University, Solapur.

To, HOD MECH / All concerned guides
please in form all students & guides
6/11/19

P.A.H. SOLAPUR UNIVERSITY, SOLAPUR

Statement showing who have applied for M.E. Dissertation in subject of : **Mechanical Engineering** **RRC date : 27/09/2019**

Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
Mr. Jadhav Sanket Sanjayrao SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	ME Aug. 2013	**Prof. S. V. Jadhav** SVERI's College of Engineering, Pandharpur	"Comparison of Experimental and Numerical Analysis of Al-Sic Metal Matrix Composite	Approved
Miss. Jadhav Shubhangi Dilip SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	ME Aug. 2013	**Prof. S. V. Jadhav** SVERI's College of Engineering, Pandharpur	"Numerical and Experimental Analysis of Tuned Vibration Absorber to Find Optimum Position and Minimize Hand-Arm Vibration"	Approved
Mr. Sapkal Avinash Dattatray SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Dr. A. A. Utpat** SVERI's College of Engineering, Pandharpur	"An Experimental Analysis and Simulation of 3D PCM Technology"	Approved
Mr. Waghamare Dattatray A. SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Dr. N. D. Misal** SVERI's College of Engineering, Pandharpur	"Process Optimization of PCM on 3D Surface"	Approved
Mr. Vibhute Prakash Ashok SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Dr. B. P. Ronge** SVERI's College of Engineering, Pandharpur	"Design, Fabrication and Fluid Flow Analysis of Electromagnetically Actuated Check Valve Based Micropump."	Approved
Mr. Shinde Shekhar Gajanan SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Dr. R. R. Gidde** SVERI's College of Engineering, Pandharpur	"Study of Piezoelectric Actuation Based Valveless Micropump Used in Microfluidic Applications"	Approved
Mr. Gade Shubham Bapurao SVERI's College of Engineering, Tal- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Dr. B. P. Ronge** SVERI's College of Engineering, Pandharpur	"Optimization of Process Parameters for AISI H21 Material using Design of Experiment (DOE) Techniques"	Approved



Statement showing who have applied for M.E. Dissertation in subject of : **Mechanical Engineering** **RRC date : 27/09/2019**

Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
·. Survase Ramling Suresh ERI's College of Engineering, l- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Prof. S. B. Bhosale** SVERI's College of Engineering, Pandharpur	"Manufacturing and Analysis of Natural Sisal Fiber and Sugar Cane Powder Hybrid Composite"	**Approved**
iss. Gaikwad Kanchan Sadashiv 'ERI's College of Engineering, l- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Dr. R. R. Gidde** SVERI's College of Engineering, Pandharpur	Design Optimization for Brake Pedal Used in Automobile Application"	**Approved**
r. Kamble Pravin Chandrakant 'ERI's College of Engineering, ıl- Pandharpur, Dist-Solapur-413304	M.Tech Aug.2018	**Prof. B. D. Gaikwad** SVERI's College of Engineering, Pandharpur	"Design and Development of Device for Measurement of Geometrical and Dimensional Tolerance of Gear of Planetary Gearbox."	**Approved**

(Asst. Registrar)
Research Department (Ph.D.-I)

SVERI

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the dissertation entitled

"An Experimental Analysis and Simulation of 3D PCM Technology"

has been submitted by

Mr. Avinash Dattatray Sapkal

for partial fulfillment Degree of Master of Technology in Mechanical (Design Engineering) as per curriculum laid by the Punyashlok Ahilyadevi Holkar Solapur University, Solapur during the academic year 2019-2020. He has carried out the dissertation work under my guidance and to be the best of our knowledge the work reported here is does not form the part of any other thesis or dissertation.

(Prof. Dr. A. A. Utpat)
Guide
Department of Mechanical Engineering

(Mr. P. A. Dhavale)
M.Tech Co-ordinator
Department of Mechanical Engineering

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This is to certify that the dissertation entitled

"Study of Piezoelectric Actuation Based Valveless Micropump Used in Microfluidic Application"

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7072301	Lab Practices			2.00	O	10.00	20.00	E,X
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A

DISSERTATION

ON

"Study of Piezoelectric Actuation Based Valveless Micropump Used in Microfluidic Application"

Submitted to

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Submitted by

Mr. Shekhar Gajanan Shinde

In the partial fulfillment for the award of

M. Tech (Design Engineering)

Under the Faculty of Engineering and Technology

Under the Guidance of

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DECLARATION

I hereby declare that the dissertation entitled **"Study of Piezoelectric Actuation Based Valveless Micropump Used in Microfluidic Application"** submitted to the PAH Solapur University, Solapur is a record of an original work done by me under the guidance of Dr. R. R. Gidde, Mechanical Engineering, SVERI's College of Engineering, Pandharpur and this work is submitted after thorough study and not copied. The results embodied in this thesis have not been submitted to any other University or Institutes.

Mr. Shekhar Gajanan Shinde

Acknowledgement

This is a sincere expression of my insightful thankfulness to all those who made it possible for me to complete this project work. I would like to express my deep-felt thankfulness to my guide **Dr. R. R. Gidde** for accepting my studentship and continuously assessing my work providing great guidance through timely suggestions and discussions at every stage of this work.

I sincerely thank **Prof. Dr. B. P. Ronge**, Principal, SVERI's College of Engineering, Pandharpur. I am thankful to M. Tech. Coordinator **Prof. P. A. Dhavale** for him timely co-operation and co-ordination.

I am very much thankful to my research colleagues Shubham Gade, Prakash Vibhute and Dattatray Waghmare helped me a lot during my dissertation work. I must acknowledge my gratitude to **Prof. S. B. Bhosale** and **Prof. A. K. Parkhe** for their valuable help and support. I wish to thank all the people whose assistance was directly or indirectly a milestone in the completion of this project.

Shekhar Gajanan Shinde

ABSTRACT

The design and fabrication of piezoelectric actuation based valveless micropump has been carried out. The modelling of micropump is carried out using COMSOL Multiphysics 5.0. The performance of a piezoelectric actuation based valveless micropump in terms of flow rate has been investigated. A nozzle–diffuser based valveless micropump is modeled using a fluid–structure interaction and pzd approach. Further, the proposed piezoelectric actuation based micropump was fabricated using soft lithography technique and PCM and CO_2 laser engraving master moulds. The comparison between simulation and experimental results has been carried out validate the simulation results.

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NOMENCLATURE

The different abbreviations, acronyms and symbols, employed in the dissertation are introduced hereafter are as follows:

Abbreviation/ Acronyms	Description
μTAS	Micro Total Analysis System
PMMA	Poly-methyl-meth-acrylate
PDMS	Poly-di-methyl-siloxane
MEMS	Micro-Electro-Mechanical-System
FSI	Fluid Structure Interaction
EDM	Electric Discharge Machining
PCM	Photochemical Machining
3-D	Three-Dimensional
ρ	Density
PVM	Piezoelectric Valveless Micropump
E	Modulus of elasticity
ν	Poisson's ratio
E	Young's modulus (Pa)
G	Modulus of rigidity (Pa)
Q_{net}	Net flow rate (μl/min)
D_{PZT}	Diameter of PZT

Chapter 1

Introduction

Micropump is a pivotal component in microfluidic systems as it is essential for micro liquid handling and thus micropump has become an important research area. According to the definition of "MEMS", miniaturized pumping devices fabricated by micromachining technologies are called micropump. A micropump is a device which can be used to generate controlled flow rate in the range of L/min to ml/min. During recent years several different micropumps have been reported based on different principles and actuation mechanisms including electro-osmotic, electromagnetic, piezoelectric, electrostatic, shape memory alloy.

Among various actuation possibilities, piezoelectric (PZT) actuation offers advantages in terms of high deflection, PZT actuated valveless micropumps have advantages of simple structure and improved reliability due to elimination of valves. The structure comprises a pair of nozzle-diffuser elements and a fluid chamber. In the supply mode, the diaphragm deflects upward which results in a negative pressure inside the fluid chamber due to which fluid is drawn into the chamber via the inlet (diffuser)and outlet (nozzle). As the pressure drop across a nozzle is higher compared to that across a diffuser, more fluid is drawn via the inlet compared to that via the outlet. In the pump mode, the diaphragm moves downward thus creating a positive pressure and more fluid leaves via the outlet (diffuser) compared to that via the inlet (nozzle). Thus, a net flow from the inlet to the outlet is achieved. As piezoelectrically actuated valve less micropumps (PAVM) have simple structure and no internal movable parts, there is less risk of clogging the valves when it pumps fluid containing particles.

Micromachined pumps are essential in micro liquid handling systems. Different micropumps have been developed during the years with different advantages and drawbacks. A valve-less pump which uses the flow directing effect of diffuser elements having piezoelectric actuation is presented. One of the main advantages of the pump is the absence of moving parts, except the pump diaphragms, which reduces the risk of mechanical failure. All tested pumps show good performance and one of the micromachined versions is very good compared with most of the other micropumps.

1.1 Overview of Micropump

1.1.1 Basic Structure of Micropump

A piezoelectric micropump is similar to diaphragm type mechanical micropumps but do not use check valves to rectify flow. Instead nozzle/diffuser elements are used as flow rectifiers. A schematic illustration of valveless micropump is shown in Fig. 1.1

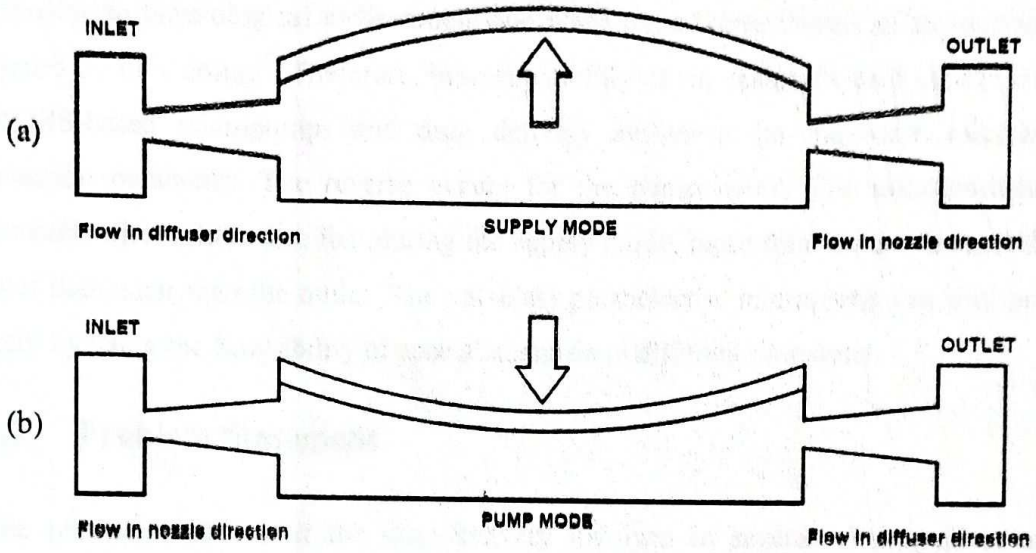


Fig. 1.1. Schematic of basic structure of valveless micropump (a) supply mode and (b) pump mode [2].

The operation of the micropump is based on the deflection of the diaphragm. As observed, during the supply mode, the diaphragm deflects upward and thus creating a negative pressure inside the chamber. In this situation, the fluid flows into the chamber through both the inlet and outlet.

Micropumps for drug delivery applications must meet basic requirements, which are listed as follows:

1. Drug biocompatibility
2. Actuation safety
3. Desired and controllable flow rate
4. Small chip size
5. Less power consumption

Biocompatibility of MEMS-based micropumps is becoming increasingly important and is regarded as a key requirement for drug delivery systems. Biocompatibility is defined as the ability of a material to perform with an appropriate host response in a specific application. As micropumps in drug delivery systems can be implanted inside the human body, therefore the materials used for fabrication must be able to fulfil rigorous biocompatibility and biostability requirements . The implanted micropump based drug delivery system must be able to withstand long term exposure to physiological environment and resist the adverse impact of surrounding tissues on its working . Therefore, biocompatibility of the materials used to fabricate MEMS-based micropumps and drug delivery system is an important materials selection parameter. The reverse occurs for the pump mode. The nozzle/diffuser elements direct flow such that during the supply mode, more fluid enters through the inlet than exist than the outlet. The valveless piezoelectric micropump can transport fluid by using the flow ability of special channels in different directions.

1.2 Problem Statement

The precise control over the drug delivery involved in several vital applications including healthcare is required for achieving a therapeutic effect. For such precise control/manipulation of the drugs, micropumps are used. These micropumps are basically of two types viz. check valve-based and valveless micropumps. The valveless micropumps are preferable due to the congestion-free operation of diffuser/nozzle valves. In this paper, design optimization of a valveless. This dissertation focuses on the investigation of piezoelectric actuation based valveless micropump, fabrication and demonstration of prototype.

1.3 Objectives

- To study different types of micropumps used in micro-fluidic applications.
- To carry out simulation of piezoelectric actuation-based valve less micropump.
- To fabricate piezoelectric actuation-based micropump.
- To perform comparison between simulation and experimental results.

1.4 Methodology

The methodology employed to achieve the objectives is as follows:

- **To study different types of micropumps used in micro-fluidics application:**

  The micropump is one of main components of drug delivery system that provides the actuation mechanism to deliver specific volumes of therapeutic agents/drugs from the reservoir. The requirements for drug delivery include a minimum flow rate in order of 10 μL/min or more, small size and high reliability. The various types of micropumps and their actuation mechanisms will be studied. The detailed study of positive displacement (mechanical) and non-mechanical micropumps will carried.

- **To carry out simulation of a piezoelectric actuation based valveless micropump:**

  Simulation of piezoelectric actuation based micropump will be carried out using suitable software. The effect of various structural parameters and operating parameters on the functional characteristics of the piezoelectric micropump will be studied. The functional characteristics such as flow rate and back pressure will be considered to evaluate the performance of the micropump. In-depth analysis of pressure flow characteristics with respect to actuating voltage and frequency will be studied.

- **To carry out fabrication of a piezoelectric actuation based micropump:**

  After micropump design, whole structure of micropump will be fabricated using polymer-based materials viz. polymethacrylate (PMMA) and polydimethylsiloxane (PDMS). The micropump will be fabricated in three main layers namely bottom layer (functional layer), middle layer (diaphragm) and top layer (actuator layer). Bonding of three layers will be carried out using suitable method. The 3-dimensional piezoelectric actuator will be attached at the top of the diaphragm. The micropump supporting structure will be fabricated using acrylic.

- **To perform comparison between simulation and experimental results:**

  The simulation and experimental results will be compared on the basis of performance characteristics. The performance characteristics such as flow rate and back pressure of a valveless micropump can be enhanced through proper selection of geometrical and operating parameters. The performance characteristics such as flow rate and back pressure of a valveless micropump are mostly influenced by geometrical as well as operating parameters. The results of flow rate and back pressure will be compared. The estimated error between two results will be studied.

Chapter 2

Literature Review

Development of all PDMS (substrate and the membrane material) valveless PZT micropumps have been reported in the literature. Many researchers have done the improvement in micropumps consist of a chamber and different diffuser design which is oscillated periodically by an actuation mechanism for different kinds of applications. Some of their work is summarized below.

Micropumps and microvalves build the foundation of many different microfluidic systems. Microvalves control routing, timing, and separation of fluids within a microfluidic device and are crucial for designs with complex functionality whereas micropumps are used for controlling and modulating fluid flow in microfluidic devices. Microvalves are used to rectify fluidic flow and used in pairs for directing fluid flow in or out of a micropump or individually in a microchannel. These microvalves can be either static or dynamic. Static microvalves are mostly mechanical check valves having micro- machined orifice and a polymer-based deflectable sealing element, whereas dynamic microvalves comprise nozzle/diffuser element, which functions as a valve. The studies on the micropump are grouped in two parts namely computational analysis, computational and experimental analysis. The literature is divided into three categories as follow:

2.1 Computational Approach

Gidde et al. [1] Micropumps are the most important components of lab-on-a-chip devices, which are becoming popular recently due to their enormous advantages. Among the different designs of micropumps, the nozzle–diffuser valveless design is the most preferred one due to simplicity in manufacturing. For the simulation of these pumps, the local fluid structure interaction modeling is important to get the performance accuracy.

Gidde et al. [2] The precise control over the drug delivery involved in several vital applications including healthcare is required for achieving a therapeutic effect. For such precise control/manipulation of the drugs, micropumps are used. These

micropumps are basically of two types viz. check valve-based and valveless micropumps. The valveless micropumps are preferable due to the congestion-free operation of diffuser/nozzle valves. An optimal set of design parameters for the proposed micropump is identified.

Gidde et al. [3] A valveless micropump based on an electromagnetic actuation for drug delivery application has been designed. The parametric studies are performed to examine the effect of divergence angle, neck width, diffuser length, height and diameter of the pump chamber and diaphragm thickness on the flow rate.

T. Barkat et al. [4] The behavior of a valveless, diaphragm-founded, piezoelectric micropump is studied and simulated. The nature of the piezoelectric actuator is a PZT-5H piezo-disk and the diaphragm is made of Silicon dioxide (SiO2). Applying Fluid-Structure Interaction (FSI) approach, the simulation for the valveless micropump is carried out in COMSOL 3.5 Multiphysics.

Nayana et al. [5] presented design and simulation of some discrete parts of a valveless piezoelectric micropump for drug delivery system. They have simulated core components of the micropump individually, which include actuator (required for creating a pumping effect) and diffuser/nozzle elements (required to rectify forward direction) by using COMSOL Multiphysics.

Cui et al. [6] designed a valveless micropump excited by a piezoelectric actuator for medical applications. To investigate the behaviors of the micropump, a complete electric–fluid–solid coupling model was built upon using ANSYS software. They analyzed the effects of the geometrical dimensions on the micropump characteristics and its efficiency. To enhance the performance of the micropump, some important diffuser parameters, such as the diffuser length, the diffuser angle, and the neck width should be optimized.

X He et al. [7] Based on the Coanda effect, a novel valveless micropump is presented in this paper, the special bluff-body is utilized to enhance the Coanda effect and increase the net flow of the micropump. In order to reveal the influence of structural parameters on the performance of novel micropump, five samples with different chamber radii (5 mm and 9 mm) are fabricated by silicon-based MEMS technology.

2.2 Experimental Approach

Pandey et al. [8] The three-dimensional numerical simulation of a micropump, including diffuser and analytical modeling of the micropump flow rate. The numerical simulation of the diffuser is performed in all possible flow regimes to optimize its geometry for maximum efficiency. The core component of the system is a piezoelectric diaphragm that can convert the reciprocating movement of a diaphragm actuated by a piezoelectric actuator into a pumping effect. The deflection in the diaphragm was analyzed by applying the voltages and pressures over different size of membrane. Nozzle/diffuser elements were used to direct the flow from inlet to outlet.

Dereshgi et al. [9] This micropump studies two piezoelectric based micropumps for biomedical applications. First, Single Diaphragm Micropump (SDM) was proposed as reference micropump. Second, Bi-diaphragm Micropump (BDM) was designed to increase the net flow rate. Essentially, the novelty of this work was that the BDM had two vibrational diaphragms that were placed in parallel. The sinusoidal voltage was applied with 180-degrees phase shift to BDM's piezoelectric actuators.

Zhang et. al. [10] In order to prevent the backward flow of piezoelectric pumps, a single active chamber piezoelectric membrane pump with multiple passive check valves. Under the condition of a fixed total number of passive check valves, by means of changing the inlet valves and outlet valves' configuration, the pumping characteristics in terms of flow rate and backpressure are experimentally investigated.

S. Revathi et. al. [11] A micropump, including diffuser and analytical modelling of the micropump flow rate. The numerical simulation of the diffuser is performed in all possible flow regimes to optimize its geometry for maximum efficiency. The deflection of the piezoelectric polymer composite circular actuator is analytically solved by theory of bending plates to determine the volumetric change and flow rate.

Sateesh J. et al. [12] Controlled drug delivery in medical application plays a prominent role, that can be achieved by micro-drug delivery devices. The efficient working of the controlled drug delivery system depends on the micropump in it. This

paper presents theoretical, design and simulated analysis of piezoelectrically actuated micropump constructed using PZT-5H material, quartz channel, and a PDMS membrane. The designed micro pump is analyzed for different structural, material changes by considering turbulent and laminar flows.

2.3 Computational and Experimental Approaches

Shen et al. [13] characterized a reciprocating PMMA ball-valve micropump actuated with a miniaturized cylindrical electromagnetic circuit, which was fabricated in PMMA and PDMS. They have optimized the structure of the electromagnet that actuates a rare-earth permanent magnet embedded in a PDMS pumping membrane by finite element calculations. Powder blasting and conventional micromachining techniques were used for fabricating micropump. The micropump exhibits a backpressure up to 35 kPa.

Das et al. [14] The flow behaviour and performance parameters of a diffuser-nozzle element of a valveless micropump have been investigated for different geometric and flow properties. When a fluctuating pressure is imposed on the inlet boundary of a diffuser-nozzle element, there is a net flow in diffuser direction due to the dynamic effect.

Zhou et al. [15] studied a single-chamber planar valveless micropump, driven by an external electromagnetic actuator by employing both the finite element method (FEM) and experimental analysis to characterize the pump performance at variable working conditions. The micropump features a pair of micro diffuser and nozzle elements, which rectify the fluid flow.

Yamahata et al. [16] presented the microfabrication and characterization of a ball valve micropump in the glass, which is magnetically actuated using the sinusoidal current of an external electromagnet. They used a polymer membrane with the permanent magnet embedded which gives rise to a large actuation stroke, which makes the micropump bubble-tolerant and self-priming.

Aggarwal et al. [17] studied piezoelectrically actuated pyramidal valveless micropumps through experimentally analysis. Valveless micropumps based on silicon

and glass substrate are fabricated using MEMS technology. The reported micropumps have low footprint, high flowrate and backpressure. Thus, these micropumps are especially suited for biological applications as these can withstand adequate amount of backpressure.

Wangikar et al. [18] The purpose of work is to study the parametric effect and optimization for Photochemical machining (PCM) of copper. The PCM has been carried out on copper by using ferric chloride as an etchant. The photo tool has been selected based on the analysis for better overall quality and minimum edge deviation. The experiments have been performed varying the (control parameters) concentration of etchant, temperature and the etching time.

S. Revathi et. al. [28] Valveless micropumps are extensively used in micro fluidic systems, including health care monitoring and diagnostic devices, computer devices, and so on, as it forms the critical component in the microsystem for precise and controlled fluid handling. This work proposes the design and development of a novel, significantly low cost, planar micropump with piezoelectric polymer composite, consisting of lead zirconate titanate for actuation.

A shape memory alloy (SMA) actuator and a polydimethylsiloxane (PDMS) elastic tube were used to realize a simple pump. A liquid plug in a flow channel could be moved forward and backward reversibly by exploiting the shape memory properties of the actuator. Two SMA sheets were used to create a peristaltic pump capable of moving a solution forward and backward over a long distance.

2.4 Research Gap

From the above literature survey, it is evident that simulation and experimental based analysis of piezo-electric actuation based valveless micropumps have been addressed previously by researchers. Although, considerable work on piezoelectric actuation based valveless micropump, investigations based on fully coupled electro-fluid–structural (pzt and fsi physics interface) interactions is not performed till date due to the complexities in respect of coupling two physics. Further, fabrication on the basis of low-cost criteria has not been done till date. Hence there is scope to perform numerical analysis and low-cost based fabrication of the piezoelectric micropump.

Chapter 3

Fundamental Aspects of Micropump

In the past decade, there has been a growing interest for the development of microfluidic systems for various applications like biological and chemical analysis, lab on chip diagnostics and drug delivery. Micropumps are an essential component in building the total fluid control system. In such system, it is essential for micro liquid handling, and thus micropump has become a vital research area. A micropump is a device which can be used to generate accurate flow rate in the range of µl/min to ml/min in accordance with the application. Presently several different micropumps have been described based on different principles and actuation mechanisms, which includes electro-osmotic, electromagnetic, piezoelectric, electrostatic, shape memory alloy etc. Compared with other actuation mechanisms, the piezoelectric actuation can provide a good reliability and moderate pressure at low power consumption, which is preferred for medical applications.

3.1 Characteristics of Microfluidics

Microfluidic systems have proved highly successful in biomedical applications by minimizing the size of electrophoresis chips, drug delivery systems, microfluidic mixers, pumps and valves, devices for cell or protein patterning, and microfluidic switches. Specially a PDMS pump is a device that is optimized for rapid prototyping and has proven to be a good material for microfluidic pump devices. First, one must know what PDMS means, PDMS stands for Polydimethylsiloxane and is most widely used as a silicon-based organic polymer. It is known for its unusual flow characteristics. The material is usually clear, inert, non-toxic, and non-flammable.

The benefits of such microfluidic devices are smaller sizes, better performance, reduction in power consumption, lowers costs, disposability, integration of control electronics, and the new functionality and reaction possibilities. These types of microfluidic devices have several characteristics and have flow that is generally laminar. They deal with smaller volumes of fluid, which results in higher precision of mixing and is safer to use with toxic and hazardous chemicals. Also these devices have high surface to volume ratio that results in effective heating and cooling.

3.2 Classification of Micropumps

According to the definition of "MEMS", miniaturized pumping devices fabricated by micromachining technologies are called micropumps. In general, micropumps can be classified as either mechanical or non-mechanical micropumps. The micropumps that have moving mechanical parts such as pumping diaphragm and check valves are referred to as mechanical micropumps where as those involving no mechanical moving parts are referred to as non-mechanical micropumps. Mechanical type micropump needs a physical actuator or mechanism to perform pumping function. The most popular mechanical micropumps discussed here include electrostatic, piezoelectric, shape memory alloy (SMA), bimetallic, ionic conductive polymer film (ICPF), electromagnetic and phase change type.

Non-mechanical type of micropump has to transform certain available non-mechanical energy into kinetic momentum so that the fluid in microchannels can be driven. Non-mechanical micropumps include magnetohydrodynamic (MHD), electro-hydrodynamic (EHD), electroosmotic, electrowetting, bubble type, flexural planar wave (FPW), electrochemical and evaporation based micropump. The classification of micropumps is shown in Fig. 3.1 MEMS technology has been successfully applied in biomedical field with the recent growth of implantable drug delivery systems. Silicon as substrate material has been used extensively as a good biocompatible material, however a trend towards the use of polymers as substrate material is growing as polymer materials are widely used in medicine and are suitable for human implantation. Polymer materials such as polymethylmethacrylate (PMMA), polydimethylsiloxane (PDMS), etc., possess relatively better biocompatibility and are increasingly being used in fabrication of MEMS micropumps. Micropumps have been investigated as drug delivery and disease diagnostic devices.

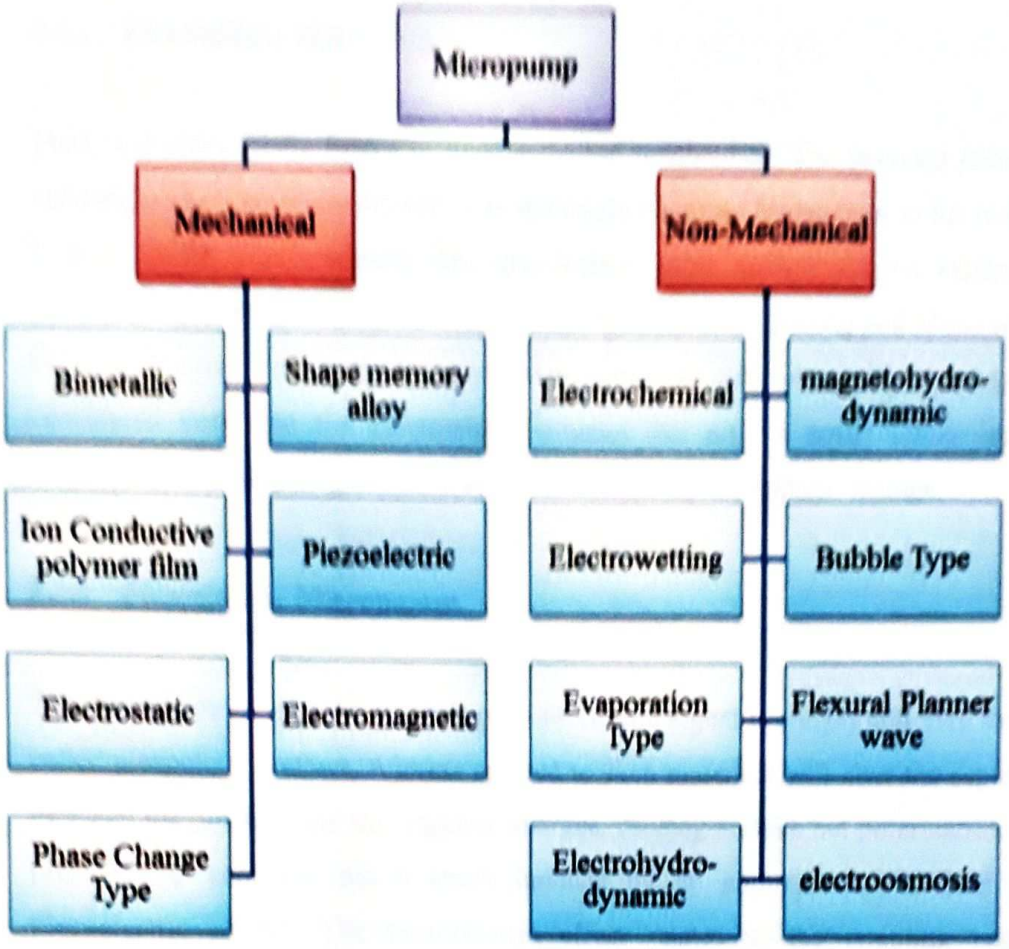


Fig. 3.1 Classification of Micropump

3.3 Mechanical Displacement Micropumps

These use the motion of a solid (such as a gear or diaphragm) or a fluid to generate the pressure difference needed to move fluid. The most common mechanical displacement micropumps are diaphragm pumps. Their actuation mechanisms are varied. They need a physical actuator for the pumping and they have moving parts. The actuator has to run itself with dead volume in the chamber. Fluid flow is achieved by oscillatory or rotational pressure forces. The oscillations create pressure), which is a function of the stroke volume inside the chamber and produced by the actuator. Examples of mechanical micropumps include piezoelectric, electrostatic, thermo pneumatic, electromagnetic, bimetallic, Ion Conductive Polymer Films (ICPF)and Shape Memory Alloy (SMA).

3.3.1 Electrostatic Micropumps

These use electrostatic forces in their actuation mechanism. The pressure difference induced by the membrane deflection in the pump chamber forces fluid in the reservoir to flow in the microchannels. The electrostatic force applied on the electrostatic plates. a the surface area of the electrodes, X the electrode spacing and V the applied voltage. Fabrication of these mechanisms on an electronic chip is generally considered easy, but the electrostatic actuator has only a small stroke and the deflection of the diaphragm can be easily controlled by the applied voltage.

3.3.2 Piezoelectric Micropumps

The conversion of mechanical energy to electronic signal (voltage) and vice versa is called piezoelectric effect. A stress applied to such materials will alter the separation between the positive and the negative charges, causing surface net polarization. This piezoelectric actuation has a strain induced by an applied electric field on a piezoelectric crystal. The piezoelectric effect relates to the coupling between mechanical deformation and electrical polarization. Piezoelectric mechanism finds common use in the reciprocating micropumps of drug delivery and other biomedical applications. Main advantages of piezoelectric actuators include large actuation force, fast response and simple structure. Their fabrication, however, is complex as is processing of piezoelectric materials. Another disadvantage is the comparatively high actuation voltage and small stroke.

3.3.3 Thermo-pneumatic Micropumps

In these types of micropumps, a chamber full of air is periodically and alternately expanded and compressed by a pair of heaters and cooler. The periodic change in the volume of the chamber gives the membrane a regular momentum so fluid can flow out. This type generates relatively large induced pressure and membrane displacement. Two disadvantages are the need for the driving power to be maintained at a constant and specific level and the slow response. The thermo-pneumatic actuation has a thermally induced volume change and/or phase change of fluids sealed

in a cavity with at least one compliant wall. The pressure increase in liquids is expressed as:

$$\Delta P = E\left[\beta \Delta T - \frac{\Delta V}{V}\right] \tag{3.1}$$

With ΔP being the pressure change, E the bulk modulus of elasticity, β the thermal expansion coefficient, ΔT is the temperature increase and $\frac{\Delta V}{V}$ is the volume change percentage.

3.3.4 Shape Memory Alloy Micropumps (SMA)

SMAs are metals that show two unique properties such as pseudo elasticity and Shape Memory (SM). The diaphragm of SMA micropumps is made mostly of Titanium/Nickel alloy (TiNi), which is a highly suitable material for micropump actuators because of its high recoverable strain and actuation force capability for large pumping rates and high operating pressures. Its high work output per unit volume makes it suitable in sizes for MEMS applications. They can change shape when subjected to a stimulus. The SM effect involves a phase transformation between two solid phases: the austenite phase (at high temperatures) and the marten-site phase (at low temperatures). When heated to austenite start temperature, the material starts forming a single-variant austenite. If not subjected to mechanical constraint, the material will return to a pre-deformed shape, retained upon cooling back to marten-site phase. If subjected to mechanical constraint, the material will exert a large force while assuming a preformed shape. Main advantages of micro SMA pumps are high force-to-volume ratio, ability to recover large transformation stress and strain upon heating and cooling processes, high damping capacity, and biocompatibility. Their disadvantages are the need for specific SMA materials, relatively high power consumption and uncontrollable deformation of the SMA owing to temperature sensitivity.

3.3.5 Bimetallic Micropumps

Bimetallic actuation functions differently on different Coefficients of Thermal Expansion (CTE) of materials. The diaphragm of bimetallic micropump is made of

two different metals having different CTEs. Bonding mechanism of dissimilar materials and their subjection to temperature changes induce thermal stresses because the coefficients of the metals differ, providing a means for actuation. The implementation extremely simple with large forces generated but the deflection of a diaphragm is only can be achieved by thermal alternation. The key advantage is that bimetallic micropumps require relatively low voltages than the other types of micropumps. Their main disadvantage is their unsuitability to high-frequency operation.

3.3.6 Ion-Conductive Polymer Film Micropumps (ICPF)

ICPFs are polymer MEMS actuators that can be actuated in aqueous environments with large deflection. They need lower input power than the conventional MEMS actuators. They are actuated by stress gradient from the ionic movement due to an electric field. Their key advantage is fast response. ICPF is composed of polyelectrolyte film with both sides chemically plated with platinum. The two films have high electrical conductivity. One diaphragm-end is fixed. An ICPF diaphragm can be controlled by bending it upside or downside in certain value of voltages applied to the electrodes within a certain duration.

The presence of an electric field causes the ions in both sides of the polymer molecule chain to move to the cathode. Simultaneously, each ion with a positive charge will take some water molecules and move towards the cathode. The ionic movement causes the cathode to expand and the anode to shrink. The presence of an alternating voltage signal will bend the films alternately. The applications of ICPF to delicate micro robots and micro manipulators that perform surgical operations have been reported. ICPF actuators have advantages such as low driving voltage, quick response and biocompatibility. They can work in aqueous environments. Their major drawback is low repeatability in batch fabrication.

3.3.7 Electromagnetic Micropumps

A typical magnetically actuated micropump has a chamber with inlet and outlet valves, a flexible membrane, a permanent magnet and a set of drive coils. Either the magnet or the set of coils may be attached to the membrane. The strength of the

magnet can be varied by changing the electric current flow through the coils. Current driven through the coils produces a magnetic field that creates attraction or repulsion between the coils and the permanent magnet which provides the actuation force. The electromagnetic actuation is realized by a solenoid plunger. The force developed by the actuator depends on the applied current and on the number of turns. A miniaturized electromagnetic actuator comprises a soft magnetic mass suspended by a spring beam and an external solenoid coil. Their main features are high power consumption and heat dissipation. Their disadvantage is the difficulty in miniaturization, owing to the size of the required solenoid coil.

3.4 Principle of Piezoelectric Valveless Micropump (PVM)

The basic principle behind the operation of this pump is the differences between pressure losses in the inlet and outlet ports, both are of the nozzle/diffuser kind. The way this port behaves depends of the flow direction on each instant, so each port behaves as a nozzle when the flow is entering in the larger area and like a diffuser when the flow is entering the smaller area. Under laminar flow regime the pressure drop is bigger for a nozzle that for a diffuser, assuming a similar geometry. Taking this into account it is clear that when the membrane moves upward the fluid is absorbed on both ends, but the pressure drop on the outlet is bigger, because it is acting as a nozzle.

3.5 Micropump Design Parameters

At the design stage, several design parameters need to be considered to analyze the performance of the micropump.

The vital design parameters which are being considered are as follows:

- Maximum flow rate (Q_{max})
- Maximum back pressure (h_{max})
- Pump power (P_{pump})
- Pump efficiency (η_{pump}).

The maximum flow rate is obtained when the pump is working at zero back pressure. At the maximum back pressure, the flow rate of the pump becomes zero because back pressure opposes the work done by the pump. Pump head or net head, can be derived from the steady flow energy equation assuming incompressible flow and neglecting viscous work and heat transfer.

3.6 Piezoelectric Effect

A piezoelectric material is capable of converting electrical energy into mechanical energy and vice versa. The direct piezoelectric effect states that these materials, when subjected to mechanical stress, generate a proportional electric charge. Gas lighters, and some acceleration and pressure sensors make use of the direct piezoelectric effect. The inverse piezoelectric effect indicates that the same material when subjected to and electrical field, become proportionally strained. Buzzers and force sensors use the inverse piezoelectric effect.

If the piezoelectric material is exposed to an electric field (voltage) it consequently lengthens or shortens proportional to the voltage. E.g. Crystal Oscillators, crystal Speakers, record player Pic ups, actuators etc. The materials with positive piezoelectric effect must have inverse piezoelectric effect, and the piezoelectric coefficients of the same material in the positive and inverse piezoelectric effects are same. The higher the piezoelectric coefficient is, the higher energy conversion efficiency of piezoelectric materials.

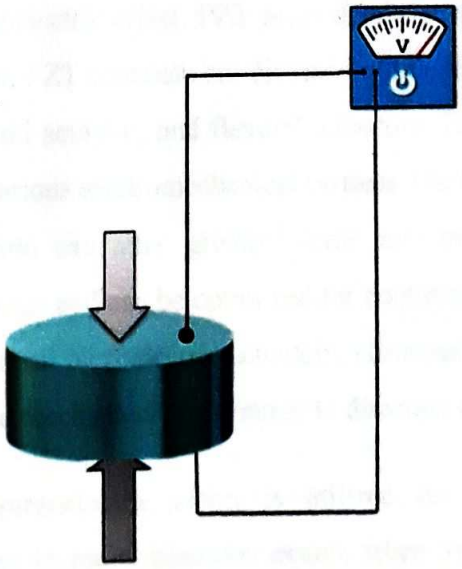


Fig. 3.2 If the applied voltage has the opposite polarity then the material contracts.

$$x = d\,E \text{ (strain} = d \times \text{electric field)}$$

An applied electric field E produces a proportional strain x (linear effect), expansion or contraction, depending on polarity. Effects of PZT shown in Fig. 3.2 and 3.3.

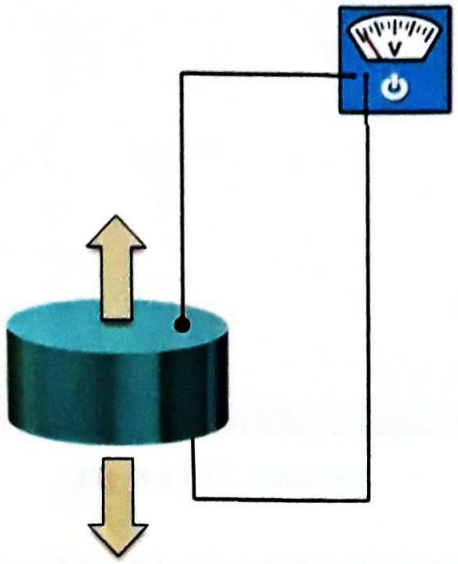


Fig. 3.3 If the applied voltage has the same polarity then the material expands

3.7 Piezoelectric Actuators

Piezoelectric materials generate electrical charge when stress is applied known as direct piezoelectric effect and mechanical strain when an electrical field is applied known as converse piezoelectric effect. PZT actuators convert electrical voltage into mechanical displacement. PZT actuators are divided in three basic categories namely, axial actuators, transversal actuator, and flexural actuators. These actuators are used as vital components in various electromechanical systems. On the basis of application, the actuator configuration can vary greatly. Axial and transversal piezoelectric actuators have high stiffness and can be optimized for controlled movements and high forces. In case of transversal piezoelectric actuators, electrical field/charge is applied in thickness direction and mechanical strain/stress in direction of plane is produced.

This converse piezoelectric effect is utilized for actuating micropump diaphragm. Displacement in radial direction occurs when voltage is applied to an actuator. When this displacement is blocked, a blocking force (a measure of the

stiffness of actuator) is developed. As a result of this blocking force, diaphragm gets deflected in upward and downward direction during suction and pump mode of the micropump.

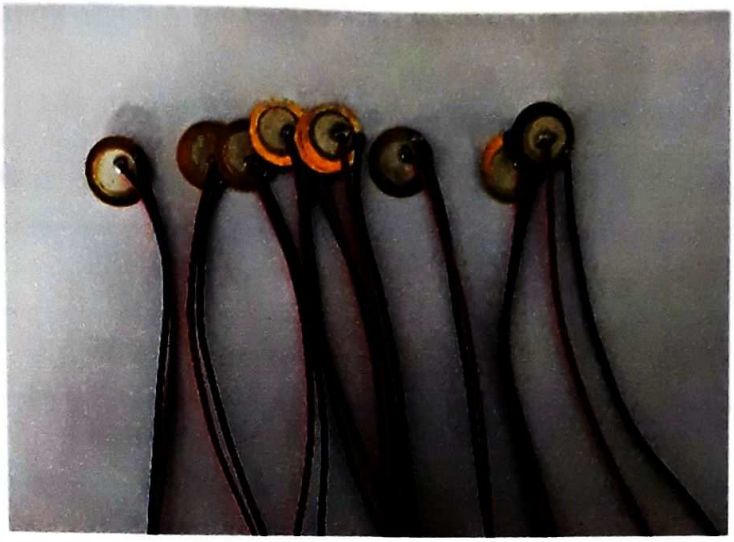
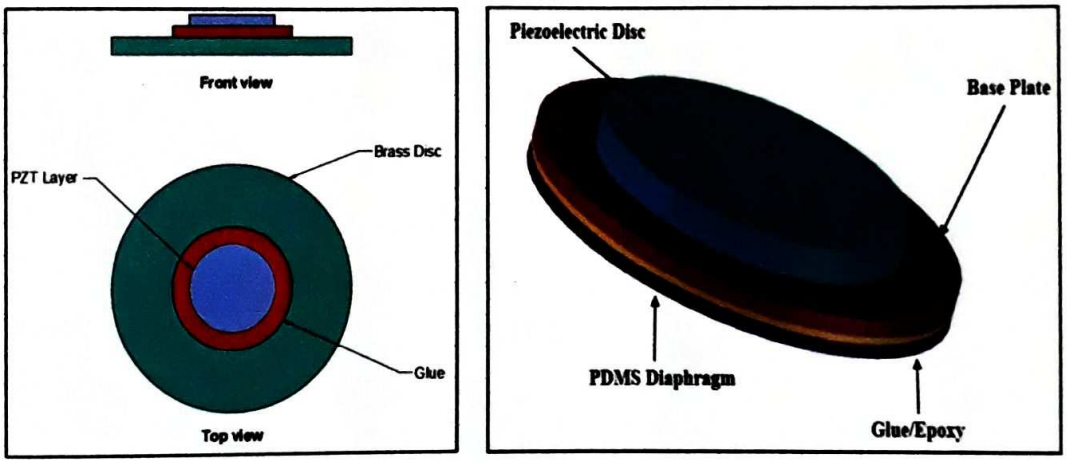


Fig. 3.4 PZT Actuators

Fig. 3.4 shows a schematic of piezoelectric actuator composed of a PZT layer, a brass substrate, glue/epoxy layer and a PDMS diaphragm.



(a) (b)

Fig. 3.5. Schematics of the Piezoelectric disc (a) 2-D View and (b) 3-D View

Piezoelectric actuation is the most commonly utilized actuation method for micropump technology. Fig. 3.5 shows the 2D and 3D view of piezoelectric disc which include different layer of PZT. This method was the first to be tested due to its attractive characteristics. This type of material provides a comparatively high stroke

volume, a high actuation force, and a quick mechanical response. Also, on a fabrication level piezoelectric material, such as PZT, is commercially available for quick integration into the particular fabricated device. Hence, piezoelectric actuator as per the details shown in the Table 3.1 has been used for the study [20].

Table 3.1 Dimension of piezoelectric actuator

Sr. No.	Parameter	Values	Unit
1.	PZT layer diameter	7.5	mm
2.	PZT layer thickness	200	µm
3.	Brass disc external diameter	12	mm
4.	Brass disc thickness	140	µm

Chapter 4

Simulation of the PZT Micropump

The numerical modelling of the piezoelectric valveless micropump is described in this chapter. COMSOL Multiphysics 5.0 was used to model the piezoelectric valveless micropump which is capable of performing fluid flow analysis using piezoelectric (pzt) and fluid–structure interaction (fsi) Multiphysics interface modules.

4.1 Model Geometry

The schematics of a piezoelectric actuation based valveless micropump is presented in Fig. 4.1 The depth of the pump chamber and the nozzle-diffuser elements is H. A piezoelectric actuator comprises different elements namely a brass disc of thickness t_{br} as supporting layer and piezo element of thickness t_{pzt} and diameter d_{pzt} which is glued to the diaphragm using epoxy glue layer of thickness t_e.

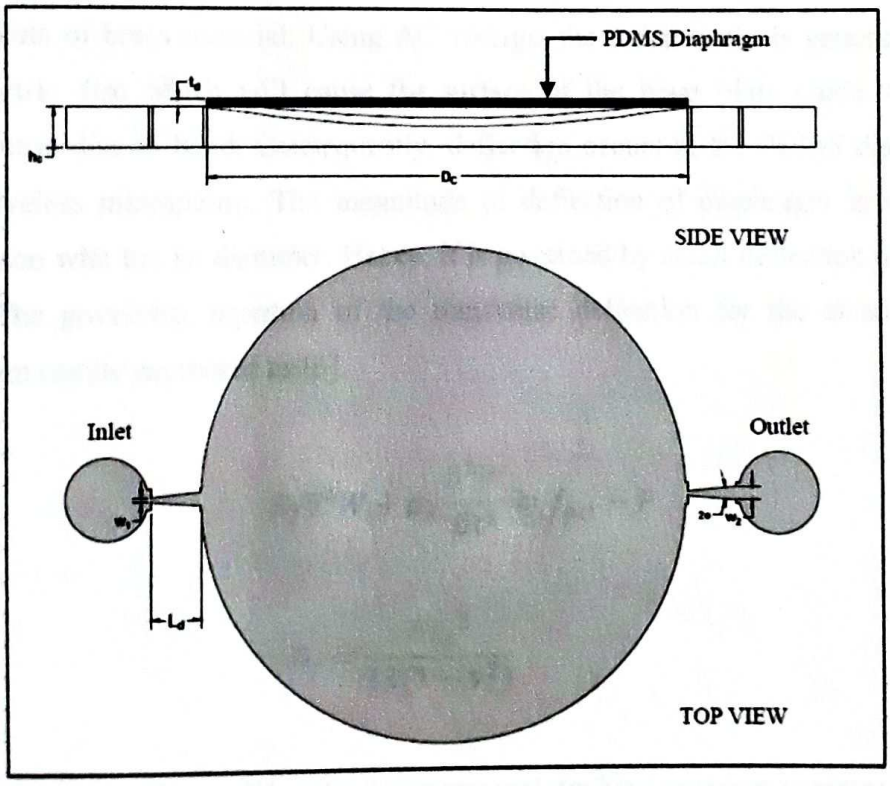


Fig. 4.1 Schematic of Piezoelectric Valveless Micropump

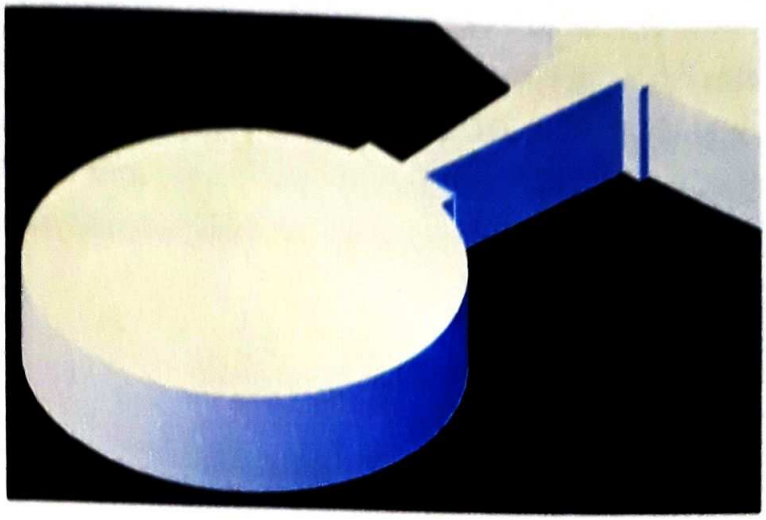


Fig. 4.2. Micropump model showing diffuser at the Inlet

4.2 Governing Equation

The two physics interface modules namely, piezoelectric devices (pzt) for the electro-structural parts and fluid–structure interaction (fsi) for fluid and structure domains, respectively were used to model the whole piezoelectric actuation based valveless micropump. The piezoelectric actuator consists of the piezoelectric disc and the thin elastic plate of brass material. Using AC voltage, the radial strain is generated in a piezoelectric disc which will cause the surface of the brass plate glued with the piezoelectric disc to bend. Consequently, deflection occurs in the PDMS diaphragm of a valveless micropump. The magnitude of deflection of diaphragm is small in comparison with the its diameter. Hence, it is governed by small deflection theory of plates. The governing equation of the transverse deflection for the elastic pump diaphragm can be expressed as [6].

$$D_f \nabla^4 W + \rho_d \frac{\partial^2 W}{\partial t^2} = f_{act} - P \tag{4.1}$$

$$D_f = \frac{E {t_d}^3}{12(1-\nu^2)} \tag{4.2}$$

D_f is the flexural stiffness, ∇^4 is the 2-dimensional double Laplacian operator, E is the Elastic modulus, m is the Poisons ratio of the diaphragm material, t_d is the thickness of the diaphragm, and ρ_d is the density of the diaphragm material. fact is the periodic

actuating force due to the strain of the actuator, and P is the dynamic pressure exerted on the diaphragm by the liquid. In this case, the pump diaphragm is assumed to be clamped to the brass plate. The flow is considered as an incompressible laminar flow, which can be described using the mass continuity Eq. [26].

$$\rho_f \frac{D\vec{V}}{Dt} = \rho_f \vec{g} + \mu \nabla^2 \vec{V} - \nabla P \tag{4.3}$$

$$\frac{\partial \rho_f}{\partial t} + (\vec{V}.\nabla)\partial \rho_f = 0 \tag{4.4}$$

where, ρ_f is the density of the liquid; $\vec{V}$ is the velocity vector; μ is the viscosity of the liquid.

4.3 Boundary Conditions

The fixed and zero displacement boundary conditions were applied at the edges of the diaphragm. To ensure zero relative motion at the interface between the diaphragm, layer of epoxy glue, brass disc and PZT element the 'always bonded boundary condition' has been employed. The PZT element is actuated using a sinusoidal voltage.

$$V(t) = V_0 \sin(2\pi f_{act} t) \tag{4.5}$$

The pressure boundary condition is employed at both inlet and outlet, and a no-slip boundary condition is applied at the walls. The working fluid used for the simulation is assumed to be incompressible, and the flow of fluid within the micropump is assumed as laminar one.

Table 4.1 Material properties and geometrical dimensions.

Element	Parameters	alues
Diffuser	Neck or throat width, w_1 (mm)	0.1
	Outlet width, w_2 (mm)	0.3
	Diffuser length (L_d)	1.1
	Divergence angle, 2θ (°)	10
	Depth, h_d (mm)	0.9
PDMS diaphragm	Diameter D_d (mm)	12.0
	Thickness, t_d (mm)	0.15
	Density, ρ_d (kg/m^3)	7800
	Young's modulus, E_d (kPa)	595
	Poisson's ratio, μ_d	0.49
Pump chamber	Diameter, D_c (mm)	12.0
	Height, h_c (mm)	0.9
Inlet/ Outlet	Inlet Diameter, d_i (mm)	2.0
	Outlet Diameter, d_o (mm)	2.0
	Inlet Depth, h_i (mm)	0.9

4.4 Simulations of the Piezoelectric Micropump

Three-dimensional simulations of the piezoelectric simulations are performed using pzd and fsi interface modules to determine the optimal set of dimensions and the operating conditions. The two domains namely, structural domain and fluid domain were coupled and meshed using grid system consisting of hexahedral elements. Simulations were run for few cycles to confirm about cycle-to-cycle variation in performance characteristics of the micropump.

The three-dimensional model of the piezoelectric micropump is shown in Fig. 4.2. Based on grid independency study, the grid as shown in Fig. 4.3 composed by structured meshing with hexahedral elements having maximum size and minimum size of 0.125 mm and 0.0125 mm, respectively was used to carry out simulations. Meshed model of valveless micropump as shown in Fig. 4.7.

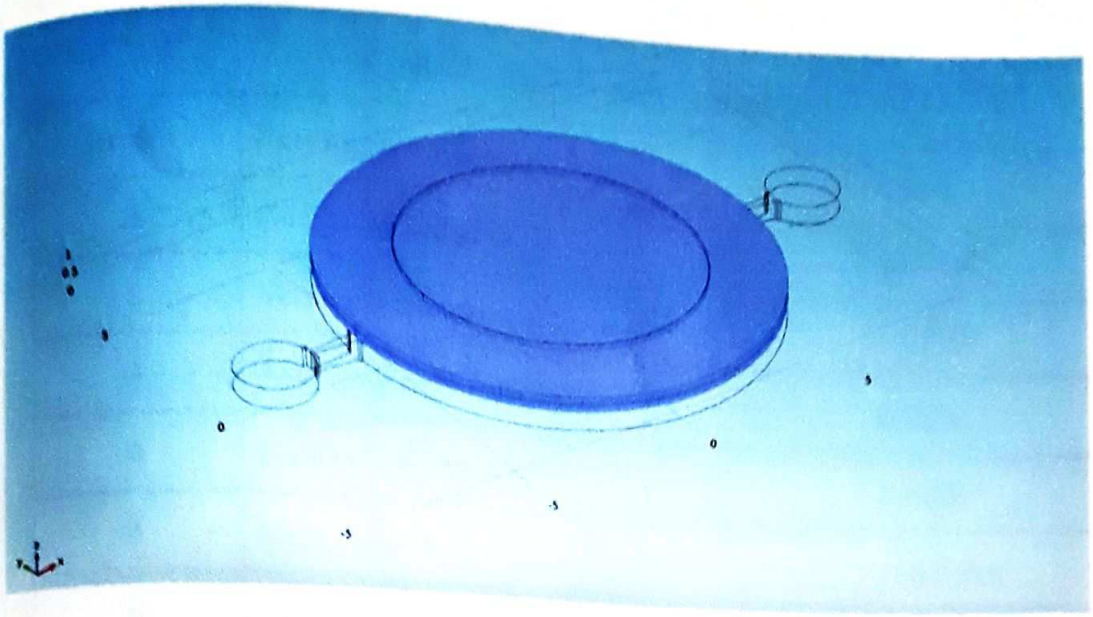


Fig. 4.3 Fluid domain (bottom layer) and structural domain

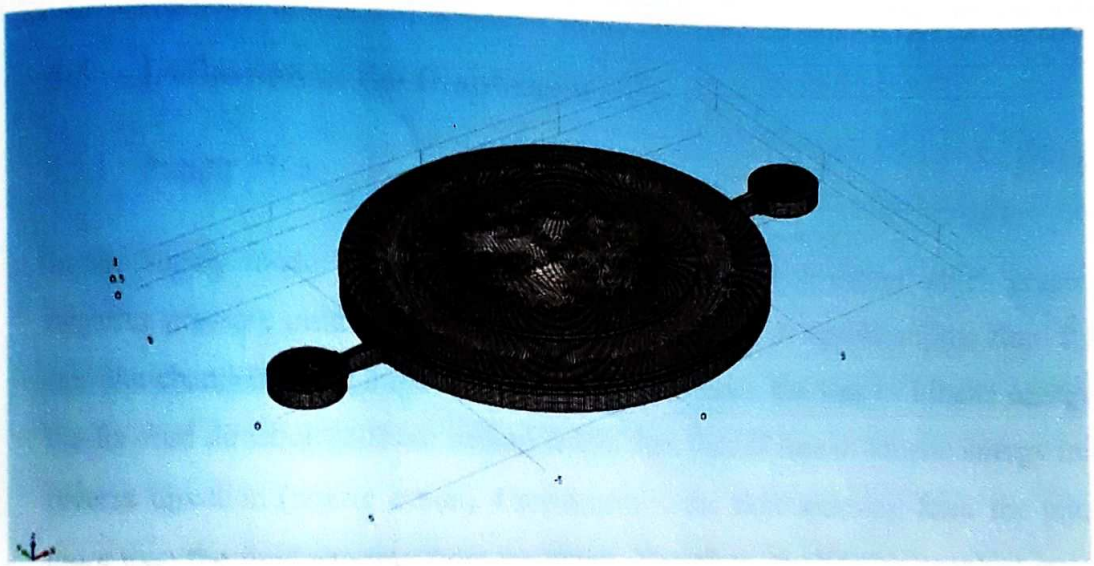


Fig. 4.4 Meshed model: Structural domain indicated by blue colored portion and fluid domain indicated by uncolored portion

Table 4.2 Parameters of complete mesh

Sr. No.	Element Type	Value
1.	Hexahedral element	285662
2.	Maximum element size	0.0801
3.	Minimum element size	0.00522

Table 4.3 Domain element statistics

Sr. No.	Parameter/variable	Value
1	Number of elements	285704
2	Minimum element quality	0.01789
3	Average element quality	0.9074
4	Element volume ratio	$8.418E^{-4}$
5	Mesh volume	108.9 mm^3
6	Maximum Growth rate	9.361
7	Average Growth Rate	1.085

4.5 Deflection of the Diaphragm

4.5.1 Supply Mode

In the supply mode, the diaphragm deflects in upward direction which creates a negative pressure inside the chamber. During this mode of operation, the fluid flows into the chamber through the inlet and outlet. However, the loss of kinetic energy in the forward direction (diffuser action) is less than that of loss of kinetic energy in the reverse direction (nozzle action). Consequently, the fluid entering from the inlet is more than the fluid entering from the outlet. Therefore, the fluid is supplied into the chamber from the inlet. During the supply mode, the diaphragm deflects in upward direction and fluid enters from both inlet and outlet through diffuser elements. It can be observed that the fluid entering through diffuser/nozzle element at the inlet during the supply mode is more than that of the flow exiting during the pump mode as a result of flow rectification caused as a result of difference in the pressure drop across nozzle and diffuser elements. Fig. 4.5 shows the Deflection of the diaphragm during supply mode.

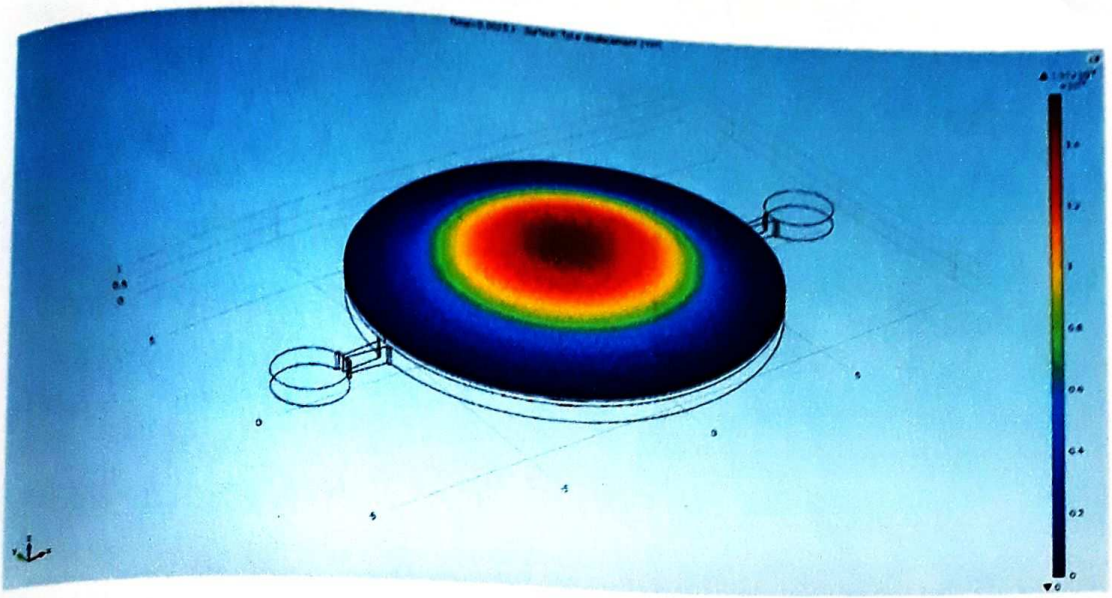


Fig. 4.5 Deflection of the diaphragm during supply mode (1.57 μm)

4.5.2 Pump Mode

During the pump mode, the diaphragm deflects in downward direction which increases the pressure of the fluid inside the chamber. As a result, the fluid from the chamber exits through the inlet and outlet. However, the fluid exiting from the outlet is more than the fluid exiting from the inlet as a result of the difference in the loss of the kinetic energy in the forward and reverse direction. Fig. 4.6 shows the Deflection of the diaphragm during Pump mode. Further, the difference in the pressure drop across the nozzle and diffuser elements during one cycle causes a flow rectification Pump Mode. Pump chamber diameter and depth are the two critical geometrical parameters which affect flow rate capability of the mechanical micropump.

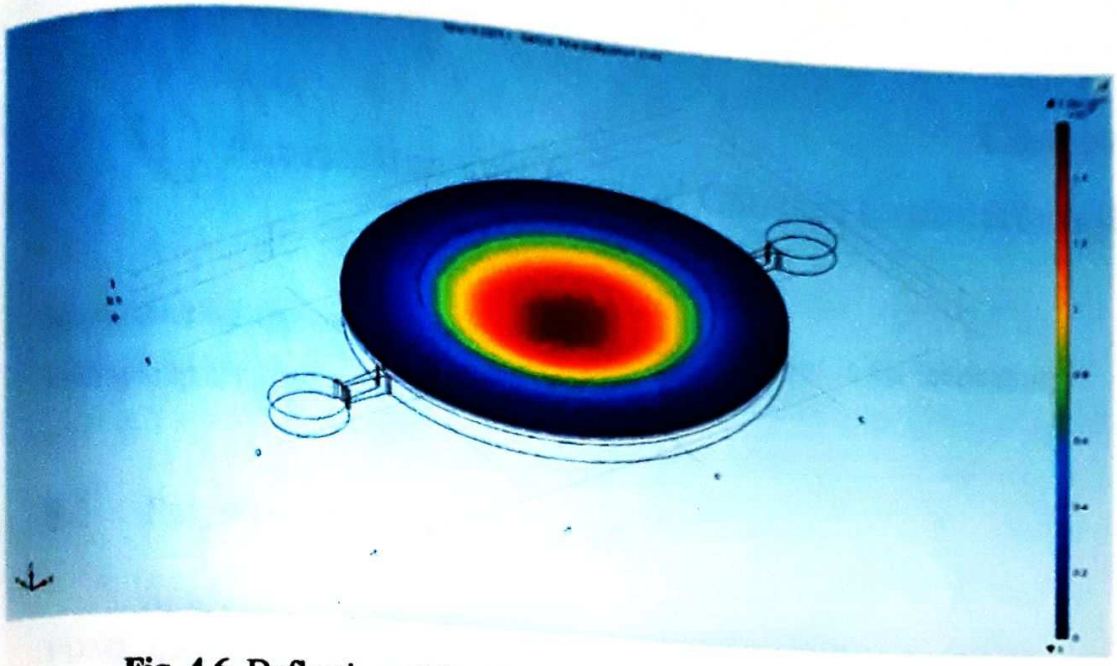


Fig. 4.6. Deflection of the diaphragm during pump mode (1.56 µm)

The variation in deflection of diaphragm as a function of time at 30 V with 100 Hz actuating frequency i.e. transient response of diaphragm deflection for two cycles is represented in Fig. 4.7. It is noted that the diaphragm deflection is more in supply mode as compared to the diaphragm deflection in pump mode. The maximum diaphragm deflection is 1.57 µm at 0.0025 s during supply mode. However, its magnitude is slightly decreased during pump mode and is 1.56 µm at 0.0075 s. This decrease in maximum diaphragm deflection during pump mode is due to the presence of the fluid within the pump chamber.

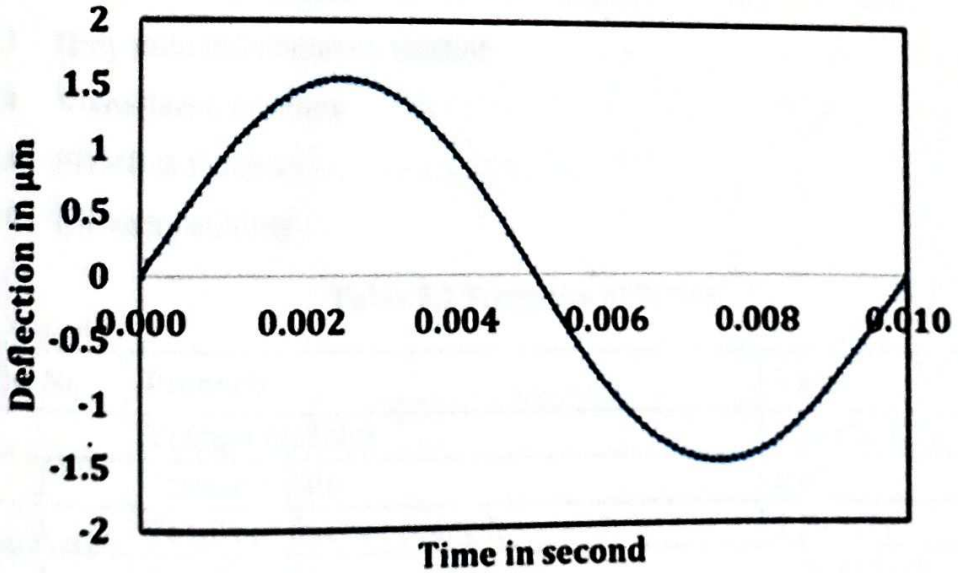


Fig. 4.7 Diaphragm deflection versus time during a cycle at actuation voltage of 30 V with actuation frequency of 100 Hz

Chapter 5

Fabrication and Proof of Concept Experimentation

Manufacturing approaches, methods and material employed in the fabrication of micropump are briefly described in this chapter.

5.1 Polydimethylsiloxane (PDMS)

PDMS has mechanical properties that make it suitable for microelectromechanical systems (MEMS). PDMS material could be applied to several types of microfluidic devices such as mixers, filters, channels, reactors, extractors, valves, flow sensors, droplets, and pumps. PDMS include operating systems size reduction, faster analytical and probability data, savings in the form of power reductions, broader design flexibility, and decrease in harmful byproducts. PDMS, a soft polymer, is being developed for use in microfluidics. Soft polymers of this caliber have advantages in the fabrication of MEMS devices.

5.1.1 Characteristics of PDMS

- Non-irritating to skin.
- Only mild inflammatory reaction
- Viscoelastic in nature
- PDMS is flexible
- Bio-compatibility

Table 5.1 Properties of PDMS

Sr. No.	Property	Value
1	Young's modulus	360-870 KPa
2	Poisson's ratio	0.49
3	Tensile or fracture strength	2.24 MPa
4	Specific heat	1.46 kJ/kg K
5	Thermal conductivity	0.15 W/mK
6	Dielectric constant	2.3-2.8

5.2 Advantages and Disadvantages of PDMS

- PDMS based microfluidic systems offer advantages over hard materials. Advantages include low cost and the time necessary to fabricate a small number of devices.
- The nature of PDMS allows for ease in modification and fabrication designs using soft lithography and replica moulding.
- The ability to produce compact sealing interfacing with optical fibres and inclusion of organic membranes were made easy through the use of soft lithography with PDMS.
- Other components or counterparts that are required to build functional devices are compatible with PDMS.
- At times some properties associated with PDMS may be affected when working with features less than twenty millimetres.
- Problems such as shrinking or sagging associated with PDMS can be eliminated with features greater than or equal to twenty millimetres.
- In the near future polymeric systems such as PDMS will replace glass and silicon systems for many biological analyses.
- Soft lithographic technology is expected to become more commercialized in the near future. Accompanying the projected commercialization of soft lithographic technology, the cost associated with current methods is expected to drop.

5.3 Polymethylmethacrylate (PMMA)

Polymethyl methacrylate (PMMA), also known as acrylic or acrylic glass, is a transparent and rigid thermoplastic material widely used as a shatterproof replacement for glass. PMMA has many technical advantages over other transparent polymer (PC, polystyrene etc.), few of them include

- High resistance to UV light and weathering
- Excellent light transmission
- Unlimited colouring options

PMMA or poly (methyl 2-methylpropenoate) is produced from monomer methyl methacrylate. It is a clear, colourless polymer available in pellet, small granules and sheet forms, which are then formed with all thermoplastic methods (including injection moulding, compression molding, and extrusion). The highest quality PMMA sheets are produced by cell casting, but in this case, the polymerization and moulding steps occur concurrently. It is commonly called acrylic glass. The strength of the material is higher than moulding grades owing to its extremely high molecular mass. Rubber toughening has been used to increase the toughness of PMMA owing to its brittle behaviour in response to applied loads.

5.4 Piezoelectric Actuator

Piezoelectric (PZT) materials more generally, exhibit a unique range of properties. In a basic sense, if a piezoelectric material is deformed, an electric charge is generated in what is known as the piezoelectric effect. The opposite of this phenomenon also holds true: If an electric field is applied to a piezoelectric material, deformation occurs in what is known as the inverse piezoelectric effect. The lead zirconate titanate (PZT) transducer has been widely used as an actuator to pump fluid in the microfluidic application. By the diaphragm deformation caused by the PZT actuator, the induced volume change of pressure chamber makes the pumping effect possible. Among those PZT deformation modes, the common type is the extension one because it is easily poled and commercially available.

The material used for the construction of piezoelectric transducer requires high reliability, a wide frequency response range, and a linear response to applied voltage with reasonably low cost. The diaphragm is actuated due to piezoelectric effect induced in the PZT disc.

Table 5.2 Specification of employed PZT disc

Sr. No.	Parameter	Value
1.	Working Voltage	30 V
2.	Working Current	< 1mA
3.	Operating Temperature Range	10 °C to 70 °C
4.	Interface Type	Analog Output
5.	Size	12 mm
6.	Weight	5g

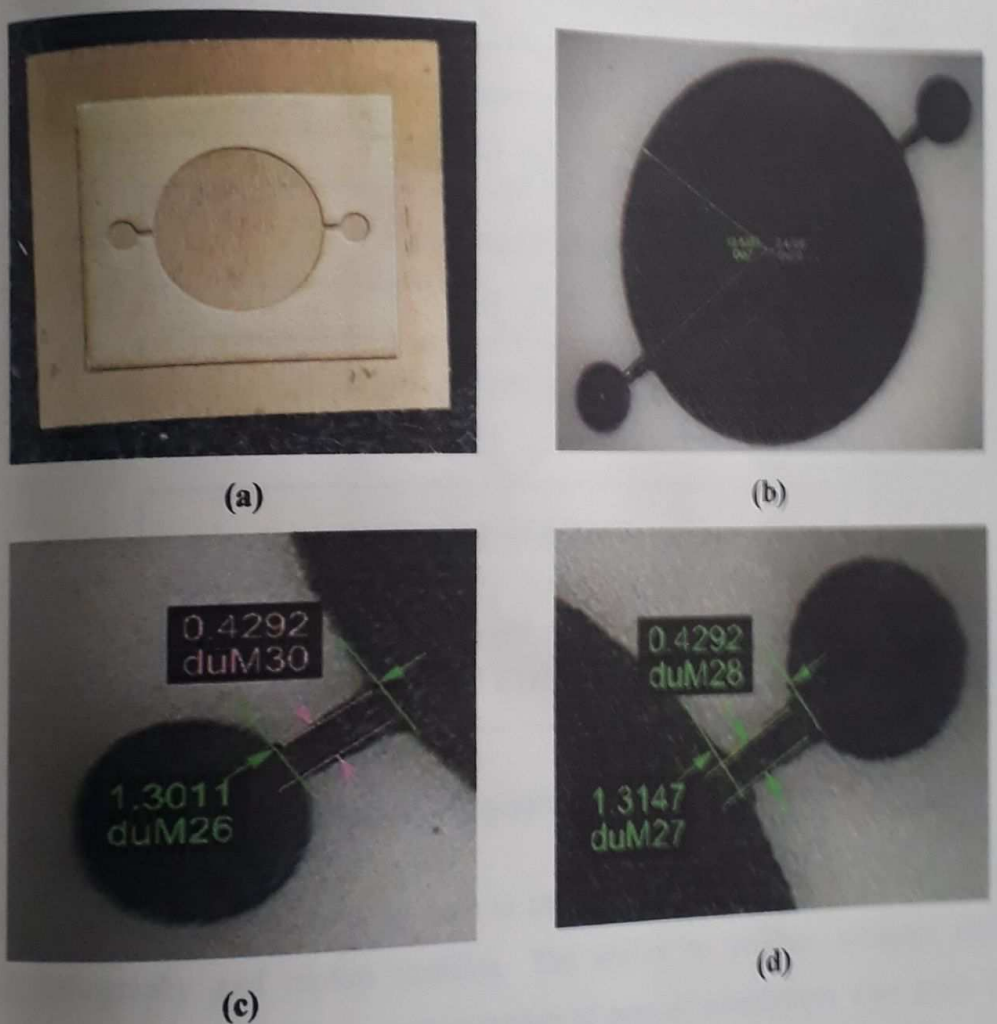
5.5 Manufacturing Method

5.5.1 Fabrication of Micro-Components

PDMS and PMMA are common materials for the fabrication of microfluidic devices for several reasons. First amongst many is the optical properties of these materials. The fabrication of PDMS/PMMA microfluidic device begins with a conceptual layout for a fluidic network.

5.5.2 Micropump Mold

The molds for rectangular wave micropump are manufactured using CO_2 Laser engraving machine for fabricating master mold with steel. The manufactured micropump mold is characterized by Rapid-I Vision Measuring System.



(a) (b) (c) (d)

Fig. 5.1 Characterization of fabricated Micropump Components

The master mold and results of the characterization of the micropump mold for the dimensions of the pump chamber, inlet and outlet chambers, channel length, width and diffuser length are shown in Fig. 5.1. Characterization is done on colored photo tool using AutoCAD drawing in digital Printing.

5.5.3 Soft Lithography

PDMS microfluidic device fabrication is done easily with the use of soft lithography and rapid prototyping. Soft lithography is the technique used as a non-photolithographic technique for pattern replication and enables rapid prototyping of devices. The flow chart of soft lithography process are as follows:

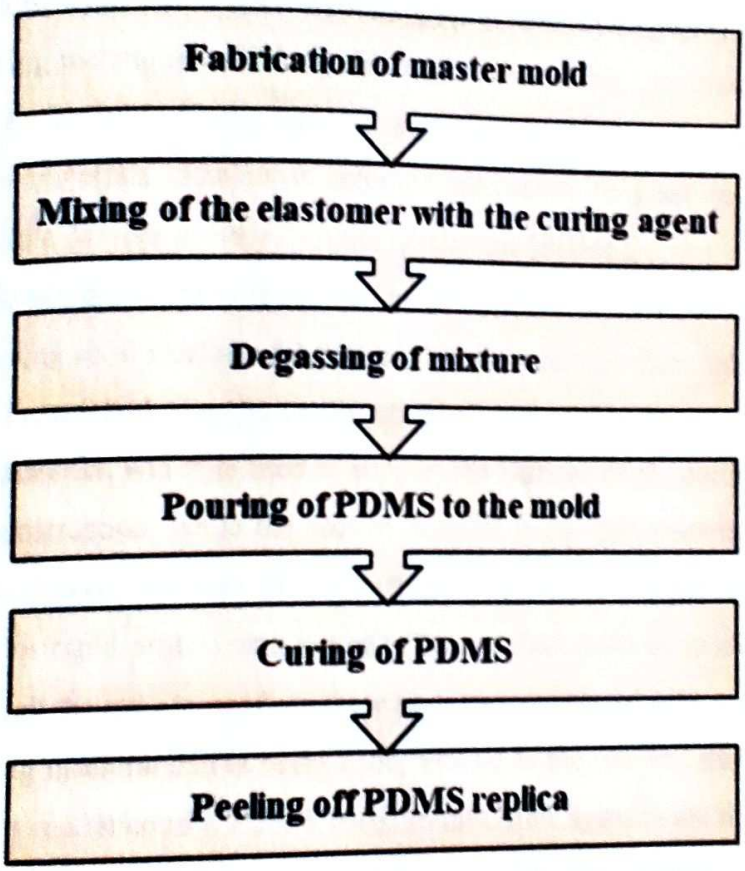


Fig. 5.2 Soft Lithography Process Flow Chart

The nature of PDMS allows for ease in modification and fabrication designs using soft lithography and replica molding. The ability to produce compact sealing interfacing with optical fibers and inclusion of organic membranes were made easy through the use of soft lithography with PDMS. A photoresist master mold can be created by standard lithographic techniques or any other technique and a liquid PDMS base solution with a curing agent is poured over the master. Due to the low surface

tension of the PDMS solution, it readily flows and takes the shape of the master. The PDMS then cures and is peeled off as a negative impression of the master pattern. Soft lithography using elastomeric polymer molding in PDMS devices allows for rapid prototyping of microfluidic devices.

5.5.4 Rapid Prototyping Process

The second fabrication process involves Rapid Prototyping Machinery. Rapid prototyping is defined as being the automatic construction of physical objects using solid freeform fabrication. A particular rapid prototyping machine was utilized in the fabrication, which involves stereolithography. Stereolithography is a common rapid prototyping technique used for producing parts with high accuracy and good surface finish. A fabrication time can be significantly reduced by selecting alternative substrate materials. The most common alternative to glass in the fabrication of microfluidic devices is the polydimethylsiloxane (PDMS).

Rapid prototyping is defined as being the automatic construction of physical objects using solid freeform fabrication. Various solid freeform fabrication techniques use two materials during the construction of parts or models. The first material is the support material, which is used to support the features of the particular part or model during construction, while the second material is the part material. This depends on the method used, the size of the part, and the complexity of the model. Additive systems for rapid prototyping typically can produce parts or models in a few hours, even though the time to produce these parts can vary widely depending on the type of prototyping machine that is being used, as well as the size and number of parts being produced simultaneously. PDMS based microfluidic systems are fabricated by casting pre-cured polymer over a positive-relief mold of the intended micro- component geometry (microchannel) and allowing the polymer to cure. The resulting PDMS replica mold sticks with glass so that the fluidic microchannel can be sealed simply by contact bonding to a glass slide.

The PDMS is a two-part mixture (polymer and hardener/cure) with a ten to one ratio mixture. To give the PDMS a more solid and rigid structure, due to the fact that it will be undergoing mechanical stresses due to the electrostatic pump, silica (clay) particles were introduced into the PDMS mixture.

The PDMS was poured into the mold, the mixture was then poured into the mold that was developed in Fig. 5.4. The PDMS is then baked for approximately one hour between sixty-five degrees Celsius up to eight-five degrees Celsius. Fig. 5.3 indicates the views of Soft lithography. It was then left to cure for approximately twenty-four hours (or longer) to allow the PDMS polymer to chemically cross-link and form a solid structure. After it has cured it can be removed by peeling the PDMS away from the micropump mold.

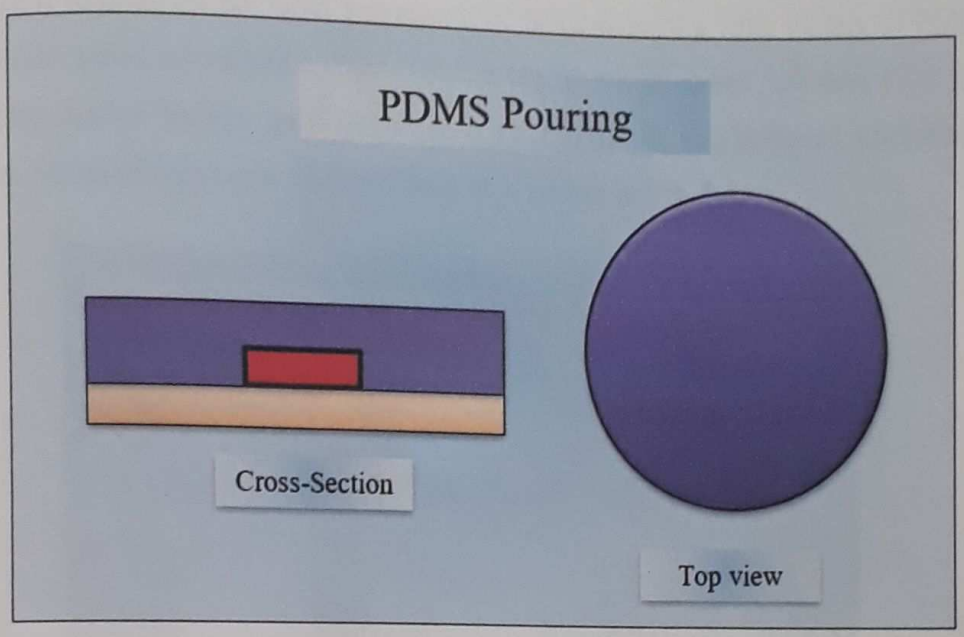


Fig. 5.3. Schematics of Soft lithography



(a) **(b)** **(c)**

Fig. 5.4 Photographs of steps involved in Soft Lithography (a) Sylgard 184 Silicone Elastomer (Manufacturer: Dow Corning), and (b) Simple Desiccator, (c) Pouring of PDMS solution.

5.5.5 CO_2 Laser Cutting Machining

A commercially available CO2 laser machine is used to perform the direct-writing ablation on acrylic substrates for microfluidic applications. It can also be used for cutting acrylic-based components. The microfluidic device designs are created using drafting software such as AutoCAD software and converted into the command signals required to drive the laser scriber in such a way as to reproduce the desired micro-component configuration on the surface of the acrylic substrate. Thus, it represents a practical solution for the rapid and economic fabrication of a wide variety of PMMA or acrylic based microfluidic chips. Thus, it can be a high-speed, low-cost CO2 laser scribing system for the rapid prototyping of PMMA or acrylic-based microfluidic chips. Set up of CO_2 Laser Cutting Machine is shown in Fig. 5.5.



Fig. 5.5 CO_2 Laser Cutting Machine

Table 5.3 Specification of CO_2 Laser machine

Parameter	Technical Details
Laser- type	Sealed CO2 laser tube, 2 inch focus lens
Laser power	60W
Engraving area	600 x 400 mm, 24" X 16"
Whole machine size	1,360 x 850 x 950 mm
Engraving speed	0 - 54,000 mm/min
Resetting position accuracy	± 0.05mm
Working voltage	AC 110 V ± 10%, 50 - 60Hz

5.6 Fabrication of Acrylic-based Components

Micropump functional layer and supporting layer required for PZT actuator are manufactured with acrylic material using CO_2 laser machining in our Advanced Manufacturing Laboratory.

The CO_2 laser machining has been used to fabricate support structure with acrylic material for the valveless micropump. The support structure is required to support the micropump and the actuator. The support structure consists of three acrylic plates. The top acrylic plate is placed over the micropump to hold the inlet and outlet tubing in position. The bottom acrylic plates are placed under the micropump to maintain the position of the actuator. The support structure of micropump including the top plate and bottom plate is as shown in Fig. 5.12.

5.6.1 Nozzle/Diffuser Element

The section of microchannel following the direction of the increase of cross-section area is called diffuser, while the section following the direction of decrease of cross-section area is called nozzle. Two nozzle/diffuser elements have the same geometrical dimensions. The diffuser and the nozzle are used as the inlet and outlet of the micropump chamber respectively. For easy integrating with other MEMS devices and high performance, the planar nozzle/diffuser element is used. At smaller divergence angle, the rectification efficiency is low as both nozzle and diffuser offer the same resistance and thus the net flow rate increases with increase in divergence angle. Similarly, at much higher divergence angles, the flow separation may occur which leads to the reduction in the net flow rate. Therefore, output of micropump also depends on the geometrical dimensions of the nozzle/diffuser element.

5.6.2 Pump Chamber

The pump chamber is the central section of the functional layer where fluid gets stored during suction mode and this stored fluid is forced to outlet during discharge mode. The diameter and depth of the chamber should be such that to conform to the diameter and the thickness of the piezoelectric actuator with sufficient space for storing fluid.

5.6.3 Diaphragm

The piezoelectric actuator consists of the piezoelectric disc and the thin elastic plate of brass material. Using AC voltage, the radial strain is generated in a piezoelectric disc which will cause the surface of the brass plate glued with the piezoelectric disc to bend. above Figure shows the structure of the diaphragm, which will be analyzed in two separate structures a tri-layer disk (PZT disk, glue/epoxy layer). Because the PZT disk is bonded to the epoxy, the radial expansion or contraction of the PZT disk makes the plate deflect upward or downward depending on the polarity of the voltage input. Consequently, deflection occurs in the PDMS diaphragm of a valveless micropump. the pumping effect of a bossed silicon diaphragm valve that was actuated periodically with the use of a piezoelectric bimorph.

The magnitude of deflection of diaphragm is small in comparison with the its diameter. A PZT disk attached on a diaphragm can oscillate the diaphragm as a function of the voltage input to the PZT disk. Fig. 5.6 shows the Acrylic-based component of micropump. The diaphragm oscillation changes the chamber pressure and moves the liquid along the channels connected to the chamber. Therefore, in order to properly evaluate the flow characteristics of a diaphragm micropump.

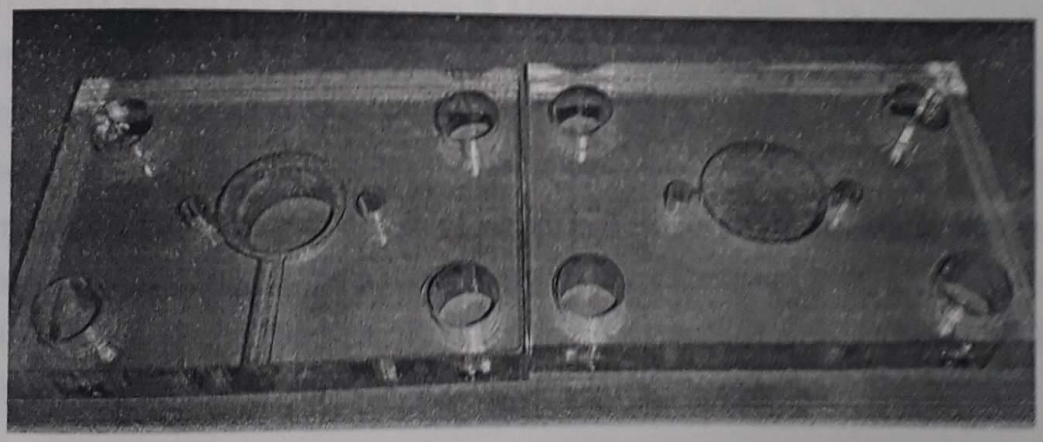


Fig. 5.6 Acrylic-based component of micropump (a) Left: Layer for supporting PZT and (b) Micropump functional layer

5.7 Fabrication of PCM-based micropump molds

Accordingly, the mask of micropump for X-ray lithography is fabricated on brass using UV lithography. Using UV lithography, pattern is transferred on resist coated

brass or copper substrate. The mixture of ferric chloride and water are used for etching. The detailed process for mask preparation is described below:

- **Cleaning:** The organic or inorganic contaminations present on the thin sheet of copper and brass are removed by wet chemical treatment.
- **Coating:** A substrate of brass sheet of 100μm thickness is coated with a negative photoresist LPR.
- **Exposure:** The prepared substrate is exposed for the time of 2 min under UV source.
- **Development:** The substrate is developed in developer solution for the time of 1 min.
- **Etching:** Etching is carried out using $FeCl_3$ solution.

The mask fabricated using UV Lithography are shown in Fig. 5.8. Photochemical Machining (PCM) process has originated from the knowledge of acid attack on metal. PCM process is combination of photoresist and chemical machining techniques. Photochemical machining is one of the chemical machining processes in which the photographic and chemical etching techniques are employed. This technology is relatively modern and got established as a manufacturing process. The photochemical machining process is mainly used to produce thin, complex, 2-D parts due to its ease of producing complex products with low cost and less delivery time apart from other advantage. The advantage of the process is the possibility to etch a wide range of materials such as metals, glasses or ceramics. The Copper is used as a substrate material for making master molds. However, the easiest metal to etch are copper, brass, steels, m, aluminum, and nickel (Fe, Ni, Co). procedure of PCM process are as follows:

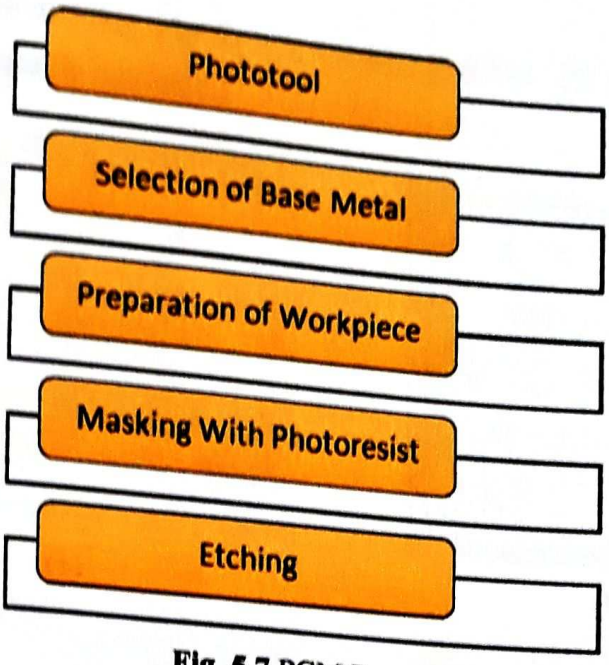


Fig. 5.7 PCM Process

The first step involved in PCM is to produce photo tool using AutoCAD drawing in digital printing. The sheet metals are chemically cleaned, and coats of a light sensitive photoresist coating applied on it. photoresist is in liquid form, and the part has to be dip coated and dried. Photo tools are used in precisely registered pairs like top and bottom. This photo tool arrangement permits the material to be etched on either side, which minimizes undercutting of photoresist. In next step the base meatal coated with the photoresist is then placed under the photo tool and exposed to an ultraviolet light source. Spraying on metal and develop the exposed image. Finally, depending upon process parameter we get desired depth of etched part or finished part is done [19].

Brass is an important material for various engineering applications, as because of its excellent electrical and thermal conductivity, easy fabrication, and good strength and fatigue properties. The Brass is the material used for this study, because it is more elastic after gold and aluminum. Photoresist chemical is blue coating ink. Developer NaOH solution and etchant of FeCl3. An aqueous solution of ferric chloride (FeCl3) is the most commonly used etchant. Materials used for this study are Brass and Copper. Photochemical machining has been carried out for copper and brass material. After machining, the edge deviation and the dimensions have been recorded with RAPID-I Vision 5 microscope. The depth of etching has been measured using the digital micrometer by calculating the volume of material removed (area x depth of

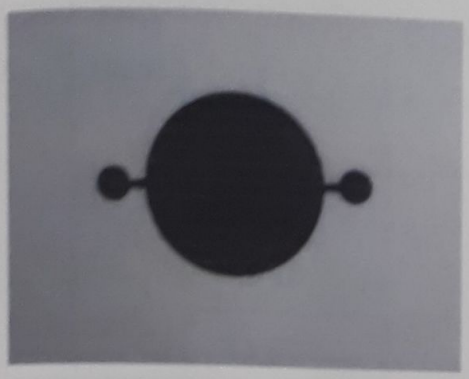
etch) in mm3and dividing it by the respective etching time, the material removal rate has been evaluated (in $mm^3/min.$).



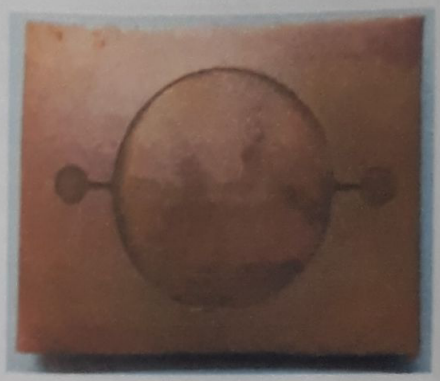
(a)



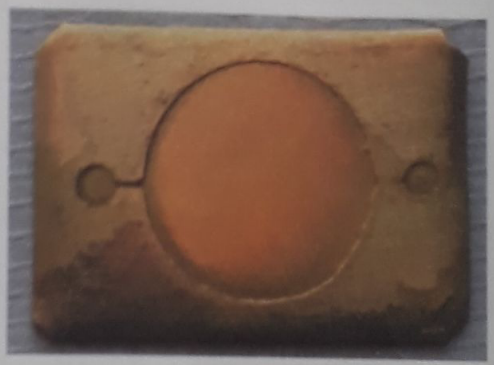
(b)



(c)



(d)



(e)

Fig. 5.8 Finished Component a) Photoresist Solution b) UV Exposing Unit c) Photo Tool Design d) Etched Micropump on Copper e) Etched Micropump on Brass

5.8 Comparison of Etching Depth for Brass and Copper

To get the precise size of the finished part by Photochemical machining process. The finished part is put under the RAPID-I machine and measures all dimensions like length, diameter etc. after the performing number of experiments we came to know

that the material removal rate of copper is more as compared to brass. by performing experiments, we have obtain following optimum conditions:

- Temperature - 40^{0}C
- Time - 45 min
- Etchant Concentration - 500 gm/lit.

For etching on brass and copper material above temperature range are suitable for fabricating the design. Using the above optimum parameter, we have obtained proper etching depth about (40 to 500) micron.

Table 5.4 Experimental Reading for Temperature and Etching Depth

Sr. No.	Time (min)	Temperature (°C)	Depth of etching on brass (µm)	Depth of etching on copper (µm)
1	15	34	42	70
		36	80	95
		38	115	125
		40	152	164
2	20	34	148	200
		36	186	230
		38	220	261
		40	259	295
3	45	34	298	330
		36	335	368
		38	373	420
		40	408	470

The below Fig. 5.9 shows the etching depth of Brass and copper material with different time and temperature.

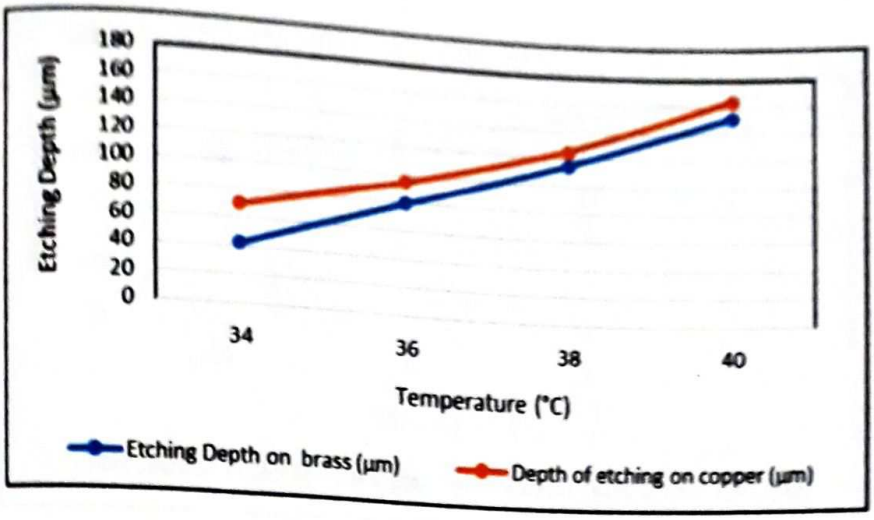


Fig 5.9 Etching Time – 15 (min)

The Fig. 5.10 shows the etching depth of Brass and copper material at different temperatures i.e. 34, 36, 38 and 40 °C respectively in 20 min.

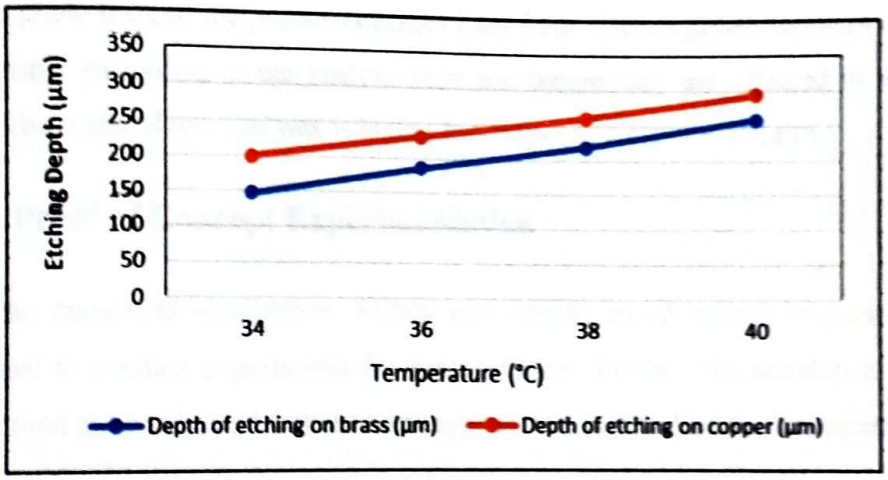


Fig. 5.10 Etching Time – 20 (min)

The Fig. 5.11 shows the etching depth of Brass and copper material at different temperature i.e. 34, 36, 38 and 40 °C respectively in 45 min.

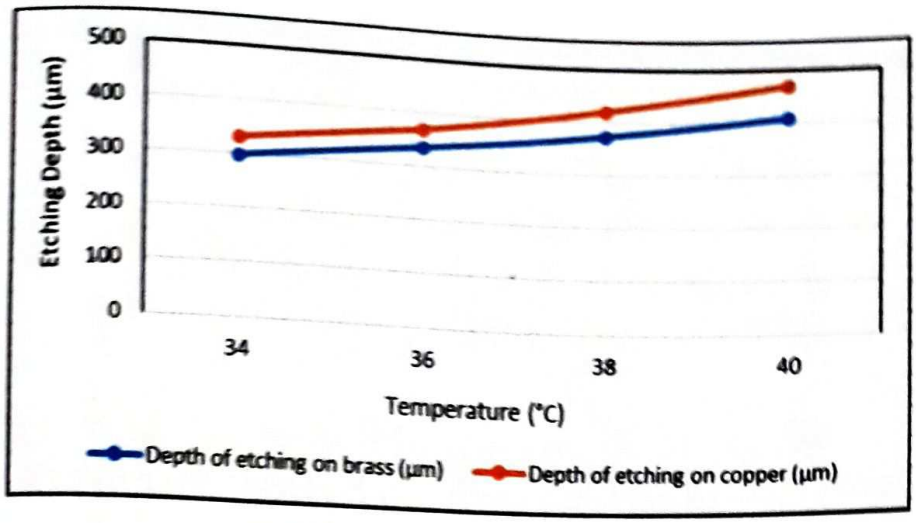


Fig. 5.11 Etching Time – 45 (min)

As the time increases from 15 min to 45 min etching depth increases accordingly. Fig. 5.9, 5.10 and 5.11 indicates the different etching depth with time for different temperatures. The negative photoresist is used and UV light passes through the colored photo tool, so the portion becomes hard from where a greater amount of light is traveling. According to our analysis time and temperature are affected by etching depth. The material removal rate is higher for copper as compared to brass.

5.9 Proof of Concept Experimentation

After the numerical simulations, PDMS and Acrylic based micro-components are fabricated to conduct experiments for demonstration. Further, the simulation results are required to be validated with the help experimental results. Hence, the experimental validation for fabricated piezoelectric actuation based valveless micropump has been carried out. The support structure consists of two acrylic plates and PDMS diaphragm. This diaphragm proper bonded between two acrylic plates. The top acrylic plate is placed over the micropump to hold the inlet and outlet tubing in position. The prototype fabricated at our in-house facility is shown Fig. 5.12.

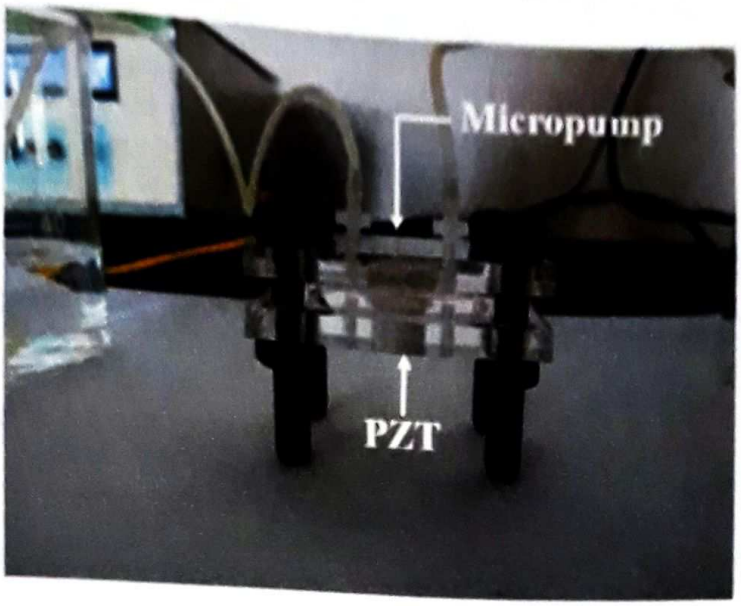


Fig. 5.12 Prototype of the piezoelectric actuation based micropump

5.9.1 Experimental Set-up

The different components of the micropump were manufactured by using methods already discussed. The micropump consists of two layers, viz. functional layer and diaphragm layer and support structure made-up of acrylic. The functional layer contains pump chamber, two diffuser/nozzle elements, inlet and outlet channels, and inlet and outlet. Whereas diaphragm layer contains permanent magnet glued to it.

Experimental setup for testing of the valveless piezoelectric actuation based micropump is depicted in Fig. 5.13 Piezoelectric power supply is used to generate the input sinusoidal voltage signal and frequency in the range 0-150 Hz. The output signal from the power supply was given to actuator for actuation. The inlet and outlet of the micropump are connected to two reservoirs (glass beakers) using silicone tubing with the inlet reservoir containing distilled water. The micropump chamber and the entire tubing are primed with distilled water prior to operation.

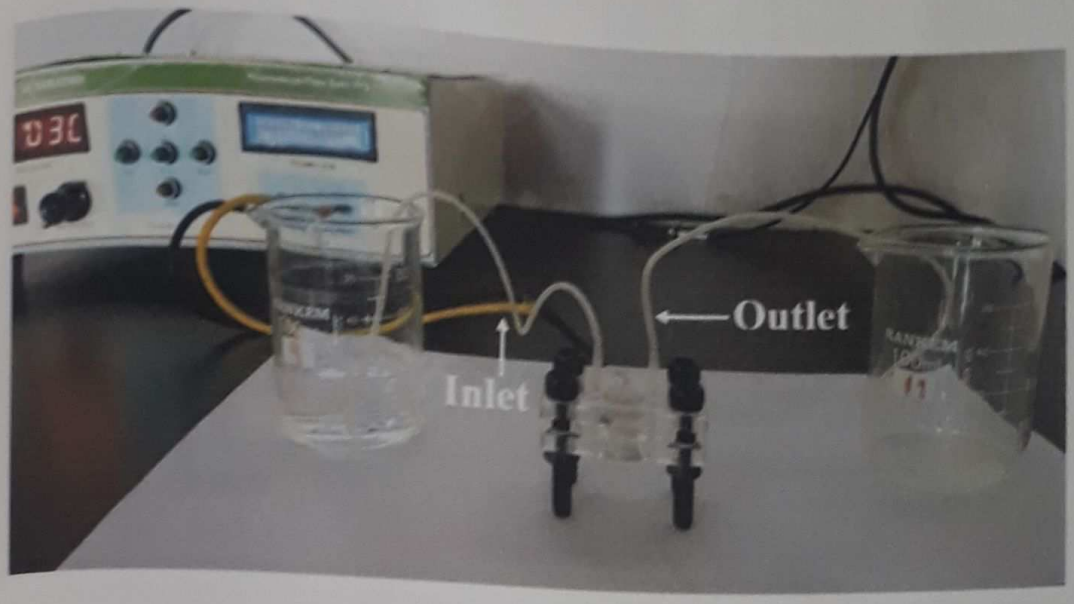


Fig. 5.13 Experimental setup for testing of a Piezoelectric actuation based Valveless micropump.

A flow rate of about 10 µl/min is measured at the actuation frequency (f) = 125 Hz. Experiment results show that, the proposed micropump is capable of delivering a flow rate of 10 µl/min at zero back pressure (Zero pressure head).

5.10 Results and Discussions

For validating results obtained through the simulations, the simulation results have been compared with the experimental results of the flow rate.

5.10.1 Flow Rate Through Simulation Study

The flow rectification can be clarified with the help of the transient response of flow rate through inlet and outlet during supply and pump modes as shown in Fig. 4.5 and Fig. 4.6. It clearly reveals that during the supply mode (Time period: 0 to 0.005 s), the fluid entering through the inlet (Q_+) into the pump chamber is more than the fluid entering through the outlet (Q_-) into the pump chamber. In contrast, during the pump mode (Time period: 0.005 to 0.01 s), the fluid leaving through the outlet (Q_+) is more than that of the fluid leaving through the inlet (Q_-).

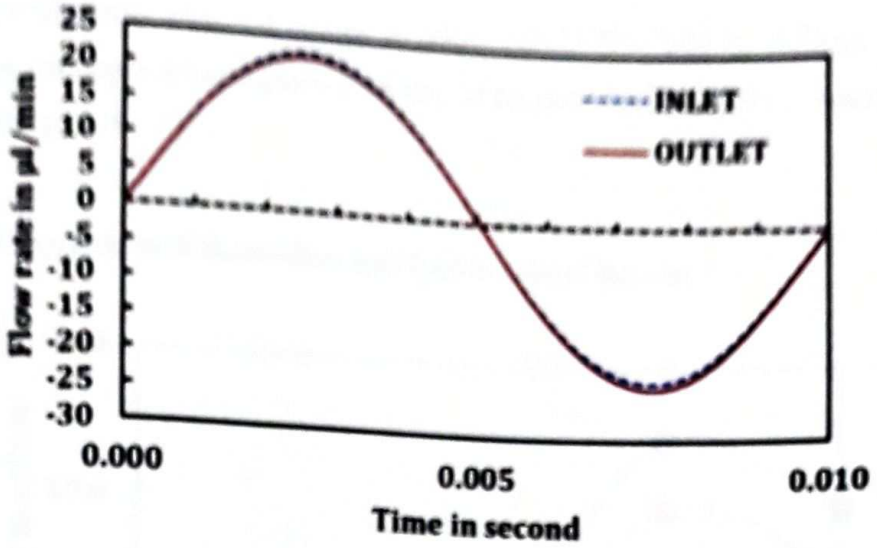


Fig. 5.14 Flow rate through the inlet and outlet as a function of time during cycle at actuation voltage of 30 V with actuation frequency of 100 Hz

The effect of the operating parameter, actuation frequency on the net flow rate needs to be studied to determine the required operating conditions to achieve the desired flow rate. The effect of actuation frequency of the sinusoidal voltage applied for during the numerical is studied numerically.

The flow rate result as a function of actuation frequency is depicted in Fig. 5.15. At the beginning, the flow rate increases with the increase in the actuation frequency. The flow rate reaches a maximum value of 10 µl /min at an actuation frequency of 125 Hz and beyond fact= 125 Hz, it goes on decreasing.

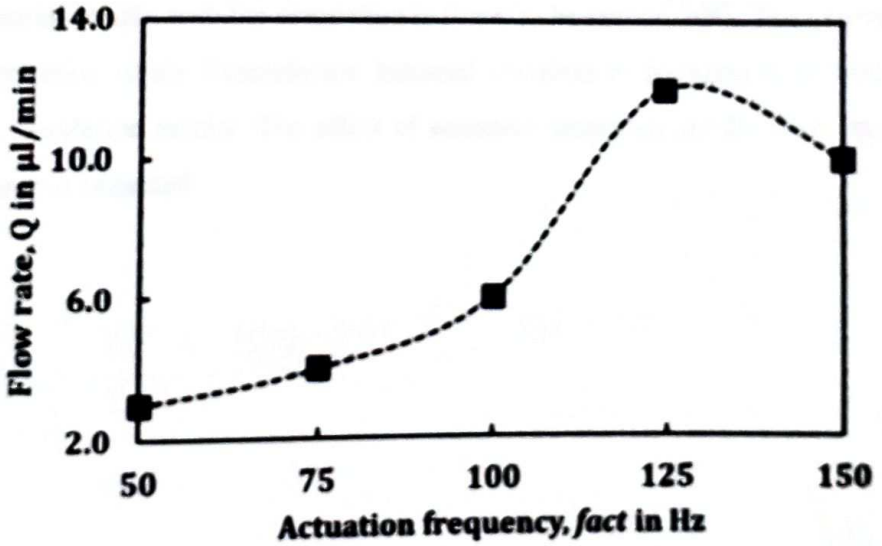


Fig. 5.15 Water flow rate as a function of actuation frequency at zero backpressure

The experimentally obtained results in terms of the flow rate as function of the actuation frequency are compared with that of the predicted using the simulations as shown in fig. 5.16.

5.10.2 Comparison of Simulation and Experimental Results

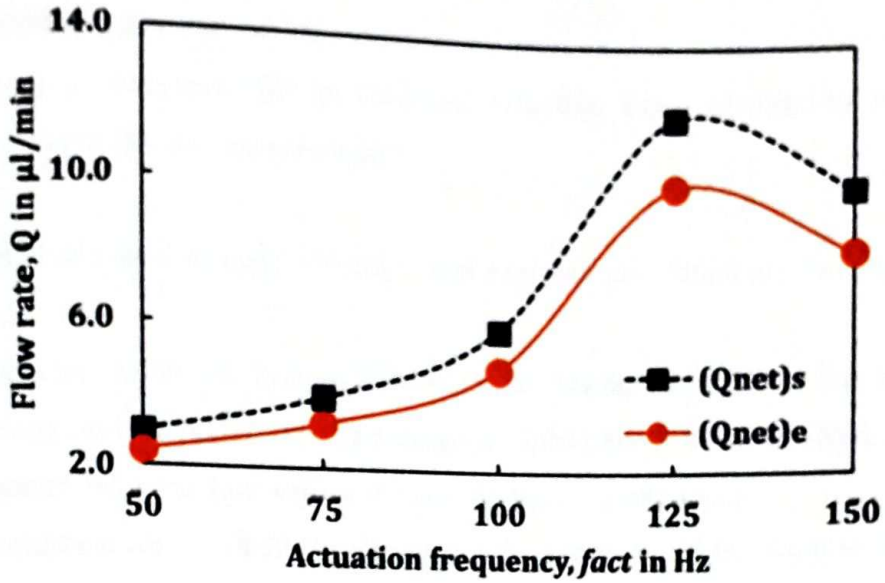


Fig. 5.16 Comparison between results obtained by simulation and experimental analysis.

It has been observed from the comparison depicted in Fig. 5.16 experimental results and simulation results for the flow rate have good agreement. The match between the experimental results with the simulation is found to be around 20%. The experimental characterization of the Piezoelectric actuated valveless micropump is carried out to validate simulation results. The effect of actuation frequency on the flow rate of the micropump is obtained.

Chapter 6

Conclusions and Future Scope

6.1 Conclusions

The working principle of piezoelectric micropump has been studied and the micropump is designed. The piezoelectric actuation based micropump has been studied numerically and experimentally.

The results obtained through simulation and experimental studies are summarized as follows:

1. Simulation results of flow at diffuser/nozzle configuration show that the flow entering into the pump chamber through the inlet during the supply mode is more as compared to the flow exiting the inlet during the pump mode.
2. At actuation voltage of 30 V and actuation frequency of 100 Hz, simulation results for total displacement of diaphragm show deflection of 1.57 μm and 1.56 μm during supply and pump mode, respectively.
3. At actuation voltage of 30 V and actuation frequency of 125 Hz, simulation results show the maximum flow rate of 12 μl/min at the outlet of micropump.
4. At actuation voltage of 30 V and actuation frequency of 125 Hz, experimental results show the maximum flow rate of 10 μl/min at the outlet of micropump.
5. The soft lithography technique can be used as one of the low-cost fabrication methods for fabricating PDMS based micro components used in microfluidic applications.
6. CO_2 laser is one amongst cheapest method for manufacturing the functional as well as supporting structures used in microfluidic applications.
7. PCM and CO_2 laser engraving can be used effectively for fabrication of moulds used in PDMS-based soft lithography.

6.2 Future Scope

Material selection for this micropump should be reviewed in order to select the compatible material for the specific application in biomedicine.

References

1. Gidde, R. R., & Pawar, P. M. (2017). On effect of viscoelastic characteristics of polymers on performance of micropump. Advances in Mechanical Engineering, 9(2), 1687814017691211.
2. Gidde, R. R., Pawar, P. M., & Dhamgaye, V. P. (2020). Fully coupled modeling and design of a piezoelectric actuation based valveless micropump for drug delivery application. Microsystem Technologies, 26(2), 633-645.
3. Gidde, R. R., Pawar, P. M., Ronge, B. P., & Dhamgaye, V. P. (2019). Design optimization of an electromagnetic actuation based valveless micropump for drug delivery application. Microsystem Technologies, 25(2), 509-519.
4. Barkat, T., Kadid, F. L., Aggoune, M. S., & Abdessemed, R. (2018). Modeling and Simulation of a Circular Valveless Micropump. Journal of the Serbian Society for Computational Mechanics/Vol, 12(2), 95-105.
5. Nayana, L., Manohar, P., & Babu, S. (2012). Design and simulation of valveless piezoelectric micropump. In 2012 COMSOL Conference in Bangalore.
6. Cui, Q., Liu, C., & Zha, X. F. (2008). Simulation and optimization of a piezoelectric micropump for medical applications. The International Journal of Advanced Manufacturing Technology, 36(5-6), 516-524.
7. He, X., Bian, R., Lin, N., Xu, W., Deng, Z., & Yang, S. (2019). A novel valveless piezoelectric micropump with a bluff-body based on Coanda effect. Microsystem Technologies, 25(7), 2637-2647.
8. Pandey, M., & Upadhyay, P. C. (2012). Design and Simulation of Valveless PZT Micropump for Drug Delivery system. Int. J. Adv. Technol, 3, 93-100.
9. Dereshgi, H. A., & Yildiz, M. Z. (2019, April). Numerical study of novel MEMS-based valveless piezoelectric micropumps in the range of low voltages and frequencies. In 2019 Scientific Meeting on Electrical-Electronics & Biomedical Engineering and Computer Science (EBBT) (pp. 1-4). IEEE.
10. Zhang, R., You, F., Lv, Z., He, Z., Wang, H., & Huang, L. (2016). Development and characterization a single-active-chamber piezoelectric membrane pump with multiple passive check valves. Sensors, 16(12), 2108.
11. Revathi, S., Padmapriya, N., & Padmanabhan, R. (2019). A design analysis of piezoelectric-polymer composite-based valveless micropump. International

Journal of Modelling and Simulation, 39(2), 110-124.

12. Sateesh, J., Sravani, K. G., Kumar, R. A., Guha, K., & Rao, K. S. (2018). Design and flow analysis of MEMS based piezo-electric micro pump. Microsystem Technologies, 24(3), 1609-1614.
13. Shen, M., Yamahata, C., & Gijs, M. A. (2008). Miniaturized PMMA ball-valve micropump with cylindrical electromagnetic actuator. Microelectronic Engineering, 85(5-6), 1104-1107.
14. Das, P. K., & Hasan, A. B. M. T. (2017, August). Flow and Performance Analysis of a Valveless Micropump. In International Conference on Advances in Computational Mechanics (pp. 773-782). Springer, Singapore.
15. Zhou, Y., & Amirouche, F. (2011). An electromagnetically-actuated all-PDMS valveless micropump for drug delivery. Micromachines, 2(3), 345-355.
16. Yamahata, C., Lacharme, F., & Gijs, M. A. (2005). Glass valveless micropump using electromagnetic actuation. Microelectronic engineering, 78, 132-137.
17. Aggarwal, S., Paul, B. E., Das Gupta, A., & Chatterjee, D. (2017). Experimental characterization of piezoelectrically actuated micromachined silicon valveless micropump. Microfluidics and Nanofluidics, 21(1), 2.
18. Wangikar, S. S., Patowari, P. K., & Misra, R. D. (2018). Parametric optimization for photochemical machining of copper using overall evaluation criteria. Materials Today: Proceedings, 5(2), 4736-4742.
19. Kamble, Bandu, et al. "3D Photochemical Machining of Copper By using Colored Phototools.
20. Bankar, R. D., Godase, A. L., Mule, A. B., Gaikwad, N. N., & Gidde, R. R. Computational Analysis of a Piezo-electrically Actuated Valve-less Micropump for Micro-fluidic Applications.
21. Munas, F. R., Melroy, G., Abeynayake, C. B., Chathuranga, H. L., Amarasinghe, R., Kumarage, P., & Dao, D. V. (2018). Development of PZT actuated valveless micropump. Sensors, 18(5), 1302..
22. Haldkar, R. K., Gupta, V. K., & Sheorey, T. (2017). Modeling and flow analysis of piezoelectric based micropump with various shapes of microneedle. *Journal of Mechanical Science and Technology*, *31*(6), 2933-2941.
23. Singh, S., Kumar, N., George, D., & Sen, A. K. (2015). Analytical modeling, simulations and experimental studies of a PZT actuated planar valveless PDMS micropump. Sensors and Actuators A: Physical, 225, 81-94.

24. Lee, C. J., Sheen, H. J., Tu, Z. K., Lei, U., & Yang, C. Y. (2009). A study of PZT valveless micropump with asymmetric obstacles. Microsystem technologies, 15(7), 993-1000.
25. He, X., Xu, W., Lin, N., Uzoejinwa, B. B., & Deng, Z. (2017). Dynamics modeling and vibration analysis of a piezoelectric diaphragm applied in valveless micropump. Journal of Sound and Vibration, 405, 133-143.
26. Fan B, Song G, Hussain F (2005) Simulation of a piezoelectrically actuated valveless micropump. Smart Mater Struct 14(2):400
27. Revathi S, Padmanabhan R (2016) Study of the effect on flow rate for planar type polymer-based diaphragm piezoelectric actuated valveless micropump for insulin delivery. Adv Mater Proc Technol 2(1):31–43
28. Revathi S, Padmanabhan R (2018) Design and Development of piezoelectric composite-based micropump. J Microelectromech Syst 27(6):1105–1113
29. Sassa F, Al-Zain Y, Ginoza T, Miyazaki S, Suzuki H (2012) Miniaturized shape memory alloy pumps for stepping microfluidic transport. Sens Actuators B Chem 165(1):157–163

Published Research Papers

Shekhar G. Shinde, Ranjitsinha R. Gidde, Subhash V. Jadhav, "On the Fabrication of Photochemical Machining-based Micropump Master Molds Used for Replica Molding, (2020). NOVYI MIR Research Journal Vol. 5(6) pp. 163-172, Impact factor 6.1. doi:16.10098.NMRJ.2020.V5I6.256342.1690.

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Has been published in

NOVYI MIR RESEARCH JOURNAL Volume 5, Issue 6, JUNE 2020.

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(Assistant Registrar)
Research Development (Ph.D.-I)

Copy to :-
The Director,
Board of Examinations and Evaluation,
P.A.H., Solapur University, Solapur.

College of Engineering
Pandharpur.
Inward No...887.....
Date -.....04/11/2019.

To, HOD CSE
Please inform it to your students and respective guide.
04/11/19

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P.A.H. SOLAPUR UNIVERSITY, SOLAPUR

Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Computer Science and Engineering** **RRC Date:27/09/2019**

Sr. No.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
1	**Mr. Krushna Bharat Pise** SVERI's College of Engineering, Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. S.M. Shinde** SVERI's College of Engg. Tal-Pandharpur, Dist-Solapur	Supply chain management system using blockchain technology	**Approved**
2	**Mr. Tushar Ramdas Bhosale** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. S.M. Shinde** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Performance evaluation of predictive and prescriptive analytics on big data	**Approved with Inclusion of Liteature reriew problem statement & proper methodology** **Suggestion: Problem statement has to be speaifed, Liteature review not in defail it should have papers refered & inference from them. System architecture has to be incluned methology is not properly given.**
3	**Ms. Vidya Balkrishna Maskar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	M.Tech. July, 2018	**Prof. V.D. Jadhav** SVERI's College of Engg., Tal-Pandharpur, Dist-Solapur	Clustering of fruits images based on color and shape using machine learning	**Approved**
4	**Mr. Shamsundar S. Bhimade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	M.Tech. July, 2018	**Prof. A.M. Dyade** SVERI's College of Engg., Tal-Pandharpur, Solapur	Data sharing with fine-grained access control using block chain technology	**Approved with inclusion of system architecture** **Suggestion : System architecture should be included in synopsis**
5	**Ms. Kanchan I Chouhan** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. V.D. Jadhav** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur-413304	Implementation of smart voting through UID verification by using face recognition	**Approved with change in title** **Suggestion title: Smart Voting through UID Verification using face Recognition**
6	**Mr. Naganath B. Khade** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. S.M. Shinde** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Effective networking intrusion detection system using machine learning	**Approved with suggestion for inclusion of system architecture** **Suggestion: Include system architecture / Block diagram in synopsis**
7	**Ms. Ashwini S. Palkar** SVERI's College of Engineering, Pandharpur, Dist-Solapur-413304	M.Tech. July, 18	**Prof. S.M. Shinde** SVERI's College of Engg. Tal-Pandharpur, Dist-Solapur	Multilevel trust in privacy preserving data market by achieving data truthfulness	**Approved**

P.T.O.

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Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Computer Science and Engineering** **RRC Date:27/09/2019**

Sr. No.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
8	**Mr. Sourab M. Sirdeshmukh** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. P.A. Satarkar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Sclapur	Agriculture soil analysis, classification and crop suitability recommendation using machine learning	**Approved**
9	**Ms. Snehal R. Korke** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. A.M. Dyade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Detecting phishing websites using machine learning	**Approved with suggestion for inculsion of system architecture Suggestion: System architecture/ Block diagram should be included in synopsis**
10	**Ms. Akshata Sunil Jadhav** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. P.A. Satarkar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Performance improvement in Li-Fi based network	**Approved**
11	**Ms. Dhanashri V. Galande** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. A.M. Dyade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Healthcare management system using blockchain technology	**Approved with suggestion for inculsion of system architecture Suggestion: Inclusion of System architecture in Synopsis**
12	**Ms. Namrata B. Dhavare** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. P.A. Satarkar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Problem solving using VLC through Li-Fi networking	**Approved with suggestion for inculsion of system architecture Suggestion: Inclusion of Block diagram or System architecture in Synopsis**
13	**Ms. Sonali Satish Kachare** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2015	**Prof. A.M. Dyade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Proposed hybrid RSA algorithm for cloud computing	**Approved with suggestion for inculsion of block diagram or system architecture in synopsis**
14	**Mr. Daiwan R. Karade** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Prof. V. D. Jadhav** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Design of an Expert System for farmers by using data analysis and data mining concepts	**Approved with change in Title Suggested title : An Expert System for Grop Predichan Using Machine Learning**

ASST. REGISTRAR
ARD SECTION
Solapur University, Solapur.

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28/08/19

The following staff member were present for synopsis presentation of our M.Tech students @ 11.30 am on wednesday, 28/08/2019 at Dept. seminar Hall.

Name of faculty members:

1) Dr. N. D. Kalande
2. Prof. P. A. Sabarkar

① Name of the student: Koushna Bharat pise

Project title : supply chain management system using Blockchain Technology

Signature :

② Name of the student:- Mr. Sham sadashiv Bhimade

Project Title :- Data shareing with fine-grained Access control using block chain Technology

Signature :

③ Name of the Student :- Mr. Tushar Ramdas Bhosale

Project Title : Performance Evaluation of Predictive and Prescriptive Analytics on Big Data

Signature :

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(4) Name of student :- Mr. Nagarath Bhavasaheb Khade.
Project Tittle : Effective Networking Intrusion Detection system using machine learning.
signature :- Khade

(5) Name of student : Mr. Saurabh Manohar Sindeshmukh
Project Title : Agriculture soil Analysis, Classification & crop suitability Recommendation Using Machine Learning.
signature : [signature]

(6) Name of student :- Ms. Jadhav Akshata Suni
Project title :- Performance Improvement in Li-fi based Network
sig :- Jadhav

(7) Name of student :- Ms. Vidya Balkrishna Maskar
project title :- Clustering of fruits image based on color and shape using machine Learning.
Sign - Maskar

(8) Name of student - Ms. chouhan kanchan Iccharam
project title - Smart voting through UID verification by using Face Recognition.
sign - [signature]

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8) Name of Student : Miss Kharade Sonali Satish

Project Title : Proposed hybrid RSA algorithm for cloud computing

Sign : Sonali

9) Name of Student : Ms. Korke Snehal Rajendra

Project Title :- Detecting phishing Websites using machine learning.

Sign :- Korkes.R

10) Name of student : Ms. Galande Dhanshri Vitthal

Project Title : Healthcare management system using Blockchain technology

Sign : Galande.

11) Name of student : Nameeta Baliram Dhavare

project Title : solving problems using VLC Through Li-Fi Networking.

Sign : Nameeta

12) Name of student : Ashwini sudarshan pallisar

project Title : Multilevel trust in privacy preserving data market by Achieving data truthfullness

sign: Aspalli

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Following staff members were present for DP-III and DP-IV Presentation of our M.Tech student on ~~online mode (google meet)~~ on 22/08/2020 at 1:30 pm time in ASL lab.

Name of faculty / student	sign
Prof. P.A. Salankar	

Name of student - / Akshata Sunil Jadhav.

Title of project - Performance Improvement in Li-fi based network

Sign - Akshata

Date - 22/08/2020

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following staff members were present for DP-III and DP-IV presentation of our M.Tech student on online mode (google meet) on 24/08/2020

=> Name of faculty / student sign.

1) Prof. S.M. Shinde. Shinde

2) Mrs. V.M. Sale ~~Sale~~

Name of student - Khade Naganath Burrsaheb

Title of project - Effective Networking Intrusion Detection System using Machine learning

Sign KhadeNB

Date 24/08/2020

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Following staff members were present for DP-III and DP-IV presentation of our BE Tech student on ~~online (google meet)~~ on 23/08/2020

Name of faculty — sign

1) Prof. A. M. Dyade.

Name of student - Snehal Rajendra Korke

Title of project - Detecting fizing websites using machine learning

Date — 23/08/2020

Sign. KorkeSR.

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Following staff members were present for ~~final~~ DP-III & DP-IV Presentation of our M.Tech student on online mode (google meet) on 21/08/2020

	Name of faculty / student	sign
1)	Prof. V.D. Jadhav	

Name of student - / Vidya. B. Maskar.

Title of project - Clustering of fruits image based on colour and shape using machine learning

sign Maskar

Date 21/08/2020

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following staff members were present for DP-III and DP-IV presentation of our M.Tech student on online mode (google meet) on 22/08/2020

Name of faculty / student sign

1) Prof. V. D. Jadhav :

Name of student - / Kanchan I. Chauhan

Title of project - Smart voting through UID verification by using face recognition

sign chauhan I.
Date 21/08/2020

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following staff members were present for final presentation and viva-voce of our M.Tech student at 12.00pm. in ASL Lab CSE Dept. on Saturday 21/11/2020 on online mode (google meet)

Sr No.	Name of faculty members.	Sign
1)	Prof. V. D. Jadhav.	
2)	Prof. A. C. Admuthe	
3)	Mrs. V. M. Sale	

Name of student :- Kanchan I. Chauhan

Title of project - Smart voting through UID verification by using face recognition.

Sign. KIChauhan

Date - 21/11/2020.

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following staff members were present for final presentation and viva-voce of our M.Tech Student at 01:00 pm in ASL Lab CSE Dept. on Saturday 21/11/2020 online mode (google meet)

Sr. No.	Name of faculty	Sign.
1)	Prof. P.A. Satarkar	
2)	Prof. A.C. Admuthe	
3)	Mr. V.M. Sale.	

Name of Student:- / Akshata S Jadhav

Title of project :- Performace improvement in Lifi based network

Sign

Date 21/11/2020

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following staff members were present for final presentation and viva-voce of our ~~ete~~ M.Tech student at 12.00 pm in ASL Lab CSE Dept on Monday 23/11/2020 online mode (google meet)

Sr.No.	Name of faculty members	Sign
1)	Prof S.M. Shinde	Shinde
2)	Prof - S.V. Patil.	
3)	Mrs. V.M. Sale.	~~Sale~~

~~Name of~~

Name of student - Mrs. Khade N.B.

Title of project - Effective Networking Intrusion Detection System using machine learning.

Sign. Khade NB

Date - 23/11/20

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following staff members were present for final presentation and viva-voice of our M.Tech student at 6.00pm. in ASL lab ESE Dept. on Monday 23/11/20 online mode (google meet)

Sr. No.	Name of faculty member	Sign
1)	Prof. A.M. Dyade	AMDyade
2)	Prof. S.D. Khatavkar.	
3)	Mr. V.M. Sale	

Name of student - Ms. Snehal B. Korke

Title of project - Detecting fishing Websites using machine learning

Sign - KorbeSR.

Date - 23/11/20

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following Staff members were present for final presentation and viva-voce of our ~~M.Tech~~ M.E. students on online mode (google meet) at 5.00 pm. on 01/12/20

Sr. No.	Name of student member.	Sign
1)	Prof. V.D. Jadhav.	
2)	Dr. N.D. Karande	
3)	Mrs. V.M. Sale.	

Name of student - Ms. Vidya B. Maskar

Title of project - clustering of fruit image based on color and shape using machine learning

Sign Maskar

Date 01/12/20

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SVERI

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the synopsis entitled

"Smart Voting through UID Verification using Face Recognition"

Has been submitted by

Miss. Kanchan Iccharam Chouhan

is hereby scrutinized and approved by ***Computer Science and Engineering Departmental*** *PG synopsis approval committee and forwarded to Punyashlok Ahilyadevi Holkar Solapur University authorities for approval of PG synopsis.*

Prof. V. D. Jadhav	(Mr. S. M. Shinde)	(CA. M. Dyade)
(Guide)	**(Examiner-I)**	**(Examiner-II)**

(Panel of PG Dissertation Report Approval Committee)

Prof. V. M. Sale	**Dr. B. C. Melinamath**	**Dr. B. P. Ronge**
P.G.Co-Ordinator	**Head, CSE. Dept**	**Principal**

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the disseratation entitled

"Performance Improvement in Li-Fi based Network"

Has been submitted by

Miss. Akshata Sunil Jadhav

is hereby scrutinized and approved by ***Computer Science and Engineering Departmental*** *PG disseratation approval committee and forwarded to Punyashlok Ahilyadevi Holkar Solapur University authorities for approval of PG disseratation during the academic year 2019-20.*

(Prof. P. A. Satarkar)
Guide

(S. M. Shinde)
Examiner-I

Examiner-II

(Panel of PG Dissertation Report Approval Committee)

(Prof. V. M. Sale)
P. G. Co-ordinator

(Dr. B. C. Melinamath)
Head, CSE. Dept.

(Dr. B. P. Ronge)
Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the synopsis entitled

"Effective Networking Intrusion Detection System Using Machine Learning "

Has been submitted by

Mr. Naganath Buvasaheb Khade

is hereby scrutinized and approved by ***Computer Science and Engineering Departmental*** *PG synopsis approval committee and forwarded to Punyashlok Ahilyadevi Holkar Solapur University authorities for approval of PG synopsis.*

Prof. S. M. Shinde		
(Guide)	**(Examiner-I)**	**(Examiner-II)**

(Panel of PG Dissertation Report Approval Committee)

Prof. V. M. Sale	**Dr. B. C.Melinamath**	**Dr. B. P. Ronge**
P.G.Co-Ordinator	**Head, CSE. Dept**	**Principal**

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the dissertation entitled

"Detecting Phishing Websites using Machine Learning"

Has been submitted by

Miss. Snehal Rajendra Korke

is hereby scrutinized and approved by ***Computer Science and Engineering Departmental*** *PG dissertation approval committee and forwarded to Punyashlok Ahilyadevi Holkar Solapur University authorities for approval of PG disseratation during the academic year 2019-20.*

(Prof. A. M. Dyade)		S. P. Powar
Guide	Examiner-I	Examiner-II

(Panel of PG Dissertation Report Approval Committee)

(Prof. V. M. Sale)	**(Dr. B. C. Melinamath)**	**(Dr. B. P. Ronge)**
P. G. Co-ordinator	Head, CSE. Dept.	Principal

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the synopsis entitled

"Clustering Of Fruits Image Based On Color and Shape Using Machine Learning"

Has been submitted by

Miss. Vidya Balkrishna Maskar

is hereby scrutinized and approved by ***Computer Science and Engineering Departmental*** *PG synopsis approval committee and forwarded to Punyashlok Ahilyadevi Holkar Solapur University authorities for approval of PG synopsis.*

(Prof. V. D. Jadhav)	(Mr. S. M. Shinde)	S. P. Pawar
(Guide)	(Examiner-I)	(Examiner-II)

(Panel of PG Dissertation Report Approval Committee)

(Prof. V. M. Sale)	**(Dr. B. C. Melinamath)**	**(Dr. B. P. Ronge)**
P. G. Co-ordinator	Head, CSE. Dept.	Principal

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सोलापूर विद्यापीठ
॥ विद्यया संपन्नता ॥

Sr. No.: 10/2017/A4 0799232

Statement of Grade for Faculty of Science & Technology-Master of Technology-Regular-Choice Based Credit System-Computer Science & Engineering-M.Tech.-II-Sem-IV
Examination: Mar-2020



Name: **CHOUHAN KANCHAN ICCHARAM (PRAMILA)**

PRN: **2018032500251133** Seat Number: **825113**

College: **College of Engineering, Gopalpur (COEP)**

Exam Center : **()**

Paper Code	Paper Name	Credits	Grade Obtained	Grade Points	Earned Gr Points	Remark
7079301	Dissertation Phase-I Synopsis Submission Seminar	3.00	O	10.00	30.00	E,X
7079302	Dissertation Phase-II ICA	3.00	O	10.00	30.00	E,X
7079303	Dissertation Phase-II Progress Seminar	3.00	O	10.00	30.00	E,X
7079304	Big Data	3.00	O	10.00	30.00	E,X
7079310	Cost Management of Engineering Projects	3.00	A+	9.00	27.00	E,X
Sem-III	**Credit: 15.00** **EGP: 147.00** **SGPA: 9.80**	**Status: Pass**				
7079401	Dissertation Phase-III Progress Seminar	3.00	O	10.00	30.00	E,C
7079402	Dissertation Phase-IV	6.00	O	10.00	60.00	E,C
7079403	Final Submission of the Dissertation and Viva-Voce	6.00	O	10.00	60.00	E,C
Sem-IV	**Credit: 15.00** **EGP: 150.00** **SGPA: 10.00**	**Status: Pass**				
Sem-III (Seat No: 825113 Exam Event: Oct-2019)						
	Total Credit: 15.00 **EGP: 147.00** **SGPA: 9.80**	**Status. Pass**				
M.Tech.-I (Seat No: 960607 Exam Event: Mar-2019)						
	Total Credit: 44.00 **EGP: 396.00** **SGPA: 9.00**	**Status: Pass**				
Cumulative	**Total Credits : 74.00** **Total EGP : 693.00** **SGPA : 9.36**		**CGPA : 9.36**		**Status : Pass**	
	Grand Total : 1937/2350 **Equivalent Percentage : 82.43 %**	**Grade : A+ (Very Good)**		**Ordinance : Not Applied**		

Abbreviations: Gr: Grade, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average, EGP: Earned Grade Points, E: Exempted, C: Current Appearance, X: Past Performance, N: Not Exempted, UM: Unfair Means, FC: Fail in University Assessment, FR: Fail in College Assessment

Punyashlok Ahilyadevi Holkar Solapur University
Board of Examinations and Evaluation

Statement No: 5956643

Date: 08 Jan 2021

Director
Board of Examinations and Evaluation

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Website : su.digitaluniversity.ac

Sr. No.: 10/2017/A4 0799234

Statement of Grade for Faculty of Science & Technology-Master of Technology-Regular-Choice Based Credit System-Computer Science & Engineering-M.Tech.-II-Sem-IV
Examination: Mar-2020



Name: JADHAV AKSHATA SUNIL (SUNITA)
PRN: 2018032500251334 Seat Number: 825133
College: College of Engineering, Gopalpur (COEP)
Exam Center : ()

Paper Code	Paper Name			Credits	Grade Obtained	Grade Points	Earned Gr Points	Remark
7079301	Dissertation Phase-I Synopsis Submission Seminar			3.00	O	10.00	30.00	P X
7079302	Dissertation Phase-II IC A			3.00	O	10.00	30.00	P X
7079303	Dissertation Phase-II Progress Seminar			3.00	O	10.00	30.00	P X
7079304	Big Data			3.00	A+	9.00	27.00	P X
7079310	Cost Management of Engineering Projects			3.00	A	8.00	24.00	P X
Sem-III	**Credit: 15.00**	**EGP: 141.00**	**SGPA: 9.40**	**Status: Pass**				
7079401	Dissertation Phase-III Progress Seminar			3.00	O	10.00	30.00	P C
7079402	Dissertation Phase-IV			6.00	O	10.00	60.00	P C
7079403	Final Submission of the Dissertation and Viva-Voce			6.00	O	10.00	60.00	P C
Sem-IV	**Credit: 15.00**	**EGP: 150.00**	**SGPA: 10.00**	**Status: Pass**				
Sem-III (Seat No: 825133 Exam Event: Oct-2019)								
	Total Credit: 15.00	**EGP: 141.00**	**SGPA: 9.40**	**Status: Pass**				
M.Tech.-I (Seat No: 960602 Exam Event: Mar-2019)								
	Total Credit: 44.00	**EGP: 380.00**	**SGPA: 8.64**	**Status: Pass**				
	Total Credits : 74.00	**Total EGP : 671.00**	**SGPA : 9.07**	**CGPA : 9.07**		**Status : Pass**		
Cumulative	**Grand Total : 1825/2350**	**Equivalent Percentage : 77.66 %**		**Grade : A+ (Very Good)**		**Ordinance : Not Applied**		

Abbreviations: Gr: Grade, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average, EGP: Earned Grade Points, E: Exempted, C: Current Appearance, X: Past Performance, N: Not Exempted, UM: Unfair Means, FC: Fail in University Assessment, FR: Fail in College Assessment

Statement No: 5956645
Date: 08 Jan 2021

Director
Board of Examinations and Evaluation

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Website : su.digitaluniversity.ac

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Sr. No.: 10/2017/A4 0799233



Statement of Grade for Faculty of Science & Technology-Master of Technology-Regular-Choice Based Credit System-Computer Science & Engineering-M.Tech.-II-Sem-IV
Examination: Mar-2020

Name: **KHADE NAGANATH BUVASAHEB (CHHAYA)**

PRN: **2018032500251303** Seat Number: **825130**

College: **College of Engineering, Gopalpur (COEP)**

Exam Center : **0**

Paper Code	Paper Name			Credits	Grade Obtained	Grade Points	Earned Gr Points	Remark
7079301	Dissertation Phase-I Synopsis Submission Seminar			3.00	O	10.00	30.00	E,X
7079302	Dissertation Phase-II ICA			3.00	O	10.00	30.00	E,X
7079303	Dissertation Phase-II Progress Seminar			3.00	O	10.00	30.00	E,X
7079304	Big Data			3.00	O	10.00	30.00	E,X
7079310	Cost Management of Engineering Projects			3.00	A	8.00	24.00	E,X
Sem-III	**Credit: 15.00**	**EGP: 144.00**	**SGPA: 9.60**	**Status: Pass**				
7079401	Dissertation Phase-III Progress Seminar			3.00	O	10.00	30.00	E,C
7079402	Dissertation Phase-IV			6.00	O	10.00	60.00	E,C
7079403	Final Submission of the Dissertation and Viva-Voce			6.00	O	10.00	60.00	E,C
Sem-IV	**Credit: 15.00**	**EGP: 150.00**	**SGPA: 10.00**	**Status: Pass**				
Sem-III (Seat No: 825130 Exam Event: Oct-2019)								
	Total Credit: 15.00	**EGP: 144.00**	**SGPA: 9.60**	**Status: Pass**				
M.Tech.-I (Seat No: 960609 Exam Event: Mar-2019)								
	Total Credit: 44.00	**EGP: 380.00**	**SGPA: 8.64**	**Status: Pass**				
Cumulative	**Total Credits : 74.00**	**Total EGP : 674.00**	**SGPA : 9.11**	**CGPA : 9.11**		**Status : Pass**		
	Grand Total : 1806/2350	**Equivalent Percentage : 76.85 %**		**Grade : A+ (Very Good)**		**Ordinance : Not Applied**		

Abbreviations: Gr: Grade, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average, EGP: Earned Grade Points, E: Exempted, C: Current Appearance, X: Past Performance, N: Not Exempted, UM: Unfair Means, FC: Fail in University Assessment, FR: Fail in College Assessment

Punyashlok Ahilyadevi Holkar Solapur University ★ Board of Examinations and Evaluation

Statement No: 5956644

Date: 08 Jan 2021

Director
Board of Examinations and Evaluation

2021.01.27 11:38

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Website : su.digitaluniversity.ac

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Sr. No.: 10/2017/A4 0799235



Statement of Grade for Faculty of Science & Technology-Master of Technology-Regular-Choice Based Credit System-Computer Science & Engineering-M.Tech.-II-Sem-IV
Examination: Mar-2020

Name: **KORKE SNEHAL RAJENDRA (RENUKA)**
PRN: **2018032500251381** Seat Number: **825138**
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7079301	Dissertation Phase-I Synopsis Submission Seminar	3.00	O	10.00	30.00	E,X
7079302	Dissertation Phase-II ICA	3.00	O	10.00	30.00	E,X
7079303	Dissertation Phase-II Progress Seminar	3.00	O	10.00	30.00	E,X
7079304	Big Data	3.00	O	10.00	30.00	E,X
7079310	Cost Management of Engineering Projects	3.00	A+	9.00	27.00	E,X
Sem-III	**Credit: 15.00 EGP: 147.00 SGPA: 9.80**	**Status: Pass**				
7079401	Dissertation Phase-III Progress Seminar	3.00	O	10.00	30.00	E,C
7079402	Dissertation Phase-IV	6.00	O	10.00	60.00	E,C
7079403	Final Submission of the Dissertation and Viva-Voce	6.00	O	10.00	60.00	E,C
Sem-IV	**Credit: 15.00 EGP: 150.00 SGPA: 10.00**	**Status: Pass**				
Sem-III (Seat No: 825138 Exam Event: Oct-2019)						
	Total Credit: 15.00 EGP: 147.00 SGPA: 9.80	**Status: Pass**				
M.Tech.-I (Seat No: 960613 Exam Event: Mar-2019)						
	Total Credit: 44.00 EGP: 392.00 SGPA: 8.91	**Status: Pass**				
Cumulative	**Total Credits : 74.00 Total EGP : 689.00 SGPA : 9.31 CGPA : 9.31**				**Status : Pass**	
	Grand Total : 1897/2350 Equivalent Percentage : 80.72 %	**Grade : A+ (Very Good)**		**Ordinance : Not Applied**		

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7079301	Dissertation Phase-I Synopsis Submission Seminar			3.00	O	10.00	30.00	E,X
7079302	Dissertation Phase-II ICA			3.00	O	10.00	30.00	E,X
7079303	Dissertation Phase-II Progress Seminar			3.00	O	10.00	30.00	E,X
7079304	Big Data			3.00	B+	7.00	21.00	E,X
7079310	Cost Management of Engineering Projects							
Sem-III	**Credit: 15.00**	**EGP: 141.00**	**SGPA: 9.40**	**Status: Pass**				
7079401	Dissertation Phase-III Progress Seminar			3.00	O	10.00	30.00	E,C
7079402	Dissertation Phase-IV			6.00	O	10.00	60.00	E,C
7079403	Final Submission of the Dissertation and Viva-Voce			6.00	O	10.00	60.00	E,C
Sem-IV	**Credit: 15.00**	**EGP: 150.00**	**SGPA: 10.00**	**Status: Pass**				
Sem-III (Seat No: 825115 Exam Event: Oct-2019)								
	Total Credit: 15.00	**EGP: 141.00**	**SGPA: 9.40**	**Status: Pass**				
M.Tech.-I (Seat No: 960615 Exam Event: Mar-2019)								
	Total Credit: 44.00	**EGP: 392.00**	**SGPA: 8.91**	**Status: Pass**				
	Total Credits : 74.00	**Total EGP : 683.00**	**SGPA : 9.23**		**CGPA : 9.23**		**Status : Pass**	
Cumulative	**Grand Total : 1878/2350**	**Equivalent Percentage : 79.91 %**		**Grade : A+ (Very Good)**		**Ordinance : Not Applied**		

Abbreviations: Gr: Grade, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average, EGP: Earned Grade Points, E: Exempted, C: Current Appearance, X: Past Performance, N: Not Exempted, UM: Unfair Means, FC: Fail in University Assessment, FR: Fail in College Assessment

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Date: 29 Jan 2021

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Board of Examinations and Evaluation

SVERI's
College of Engineering, Pandharpur

Department of Computer Science & Engineering

M.Tech. Project Sample Report

A.Y.: 2019-2020

A

DISSERTATION

ON

"Performance Improvement in Li-Fi based Network"

Submitted to

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Submitted by

Miss. Akshata Sunil Jadhav

In the partial fulfillment for the award of

M.Tech Computer Science and Engineering

Under the Faculty of Engineering and Technology

Under the Guidance of

Prof. P. A. Satarkar

Department of Computer Science and Engineering

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

2019-2020

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the disseratation entitled

"Performance Improvement in Li-Fi based Network"

Has been submitted by

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Prof. P. A. Satarkar

(Guide) **(Examiner-I)** **(Examiner-II)**

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DISSERTATION APPROVAL SHEET

This dissertation entitled **"Performance Improvement in Li-Fi based Network"** being submitted by **Miss. Akshata Sunil Jadhav** to SVERI'S College Of Engineering, Pandharpur affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur is approved for the award of degree of **Master of Technology in Computer Science and Engineering.**

Date:

External Examiner:.....

.....

Internal Examiner:.....

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DECLARATION

I certify that,

a. The work contained in this project has been done by me under the guidance of my supervisor(s).
b. The work has not been submitted to any other institute for any degree or diploma.
c. I have followed the guidelines provided by the institutes in preparing the project report.
d. I have conformed to the norms and guidelines given in the ethical code of conduct of the institutes.
e. Whenever I have used materials (data, theoretical analysis, figures, and the text) from other sources. I have given due credit to them by citing them in the text of report and giving their details in the references. Further, I have taken permission from the copyrights owners of the sources, whenever necessary.

ACKNOWLEDGEMENT

I take this opportunity to express my deep sense of gratitude to my respected and complete guides **Prof. P. A. Satarkar Madam** for their valuable help and guidance, I am thankful to them for the encouragement to have given to complete the Project.

I am also great thanks to respect **Prof. B. C. Melinamath HOD (CSE)** and to respect Principal of our collage **Dr. B. P. Ronge**, **COE Pandharpur** for permitting to utilize all the necessary facilities of the institution. I am also thanks to all the other faculty & staff member of Computer Science Department for their kind co-operation and help.

Lastly, I like to express deep perception towards my M.Tech (CSE) classmates and indent less to my parents for providing to the moral support and encouragement.

Name of Students and Signature

(Jadhav Akshata Sunil)

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ABSTRACT

Light Fidelity (Li-Fi) is an Optical wireless communication (OWC) technology, which uses light from light emitting diodes (LEDs) as a medium to deliver network, mobile, high-speed communication in a similar manner to Wi-Fi. Li-Fi can be simply position to remain Wi-Fi but in its place of radio waves light is used as a medium.

Now, data is transmitting using light whose amount varies faster than human eye to capture. In its place of using modems, Li-Fi uses LED bulbs with transceiver. Data transmission in Li-Fi is about 100 times faster than Wi-Fi. OFDM stands and 4QAM,16 QAM ,32QAM,64QAM has been reported. BER v/s SNR curves are simulated to improve their performance using light fidelity network.

There are OFDM modulation technique using image transmit to transmission to receiver using QPSK and QAM or 4QAM, 16QAM, 32QAM, 64QAM using light fidelity network are improve their performance.

Keywords: Li-Fi, Simulink, OFDM, QPSK, 4QAM, 16QAM, 32QAM, 64QAM.

1. INTRODUCTION

1.1 Overview

The term was first used by Professor Harald Haas from University of Edinburgh, United Kingdom, in his TED global talk in 2011. Li-Fi knowledge rates as "one of 50 best inventions of 2011" on TED world site on the internet. The first project which explains the knowledge of Li-Fi was The D-Light project. It was funded from January 2010 to January 2012 at Edinburgh's Institute for Digital Communications by Professor Haas.

Here we show the history of Li-Fi:

- In 2011, Haas promoted this technology in TED global talk and helped start a company to market it.
- In October 2011, companies and industry sets formed the Li-Fi consortium, to promote high-speed optical wireless systems and to overcome the limited amount of radio-based wireless variety available by using a completely different part of the electromagnetic spectrum.
- In 2012, VLC technology exhibited by using Li-Fi Consortium.
- In October 2013, Chinese manufacturers work on Li-Fi development kits.
- In April 2014, the Russian establishment Stins Coman announced the development of a Li-Fi wireless local network called Beam Caster. Their current component transfers data at 1.25 Gbps.

What is Li-Fi :

Light Fidelity (Li-fi) or is a Visible Light Communications (VLC) system is a wireless communications travelling at very high speeds. Li-Fi usages common household LED (light emitting diodes) light bulbs to enable data transfer, boasting speeds of up to 224 gigabits per second.

The idea of Li-Fi was introduced for the first time by a German physicist Harald Hass in the TED (Technology, Entertainment, and Design) Global talk on Visible Light Communication (VLC) In July 2011, by referring to it as "data through illumination". Li-Fi can be supposed of as a light-based Wi-Fi i.e. in its place of radio waves it uses light to transmit data.

In place of Wi-Fi modems, Li-Fi would use transceivers that could be light a room as well as transmit and receive information.

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Spectrum

In Li-Fi visible light communication spectrum is used to pass on information as there does much extra exiting in this spectrum, and it has the potential to pass on higher bandwidth.

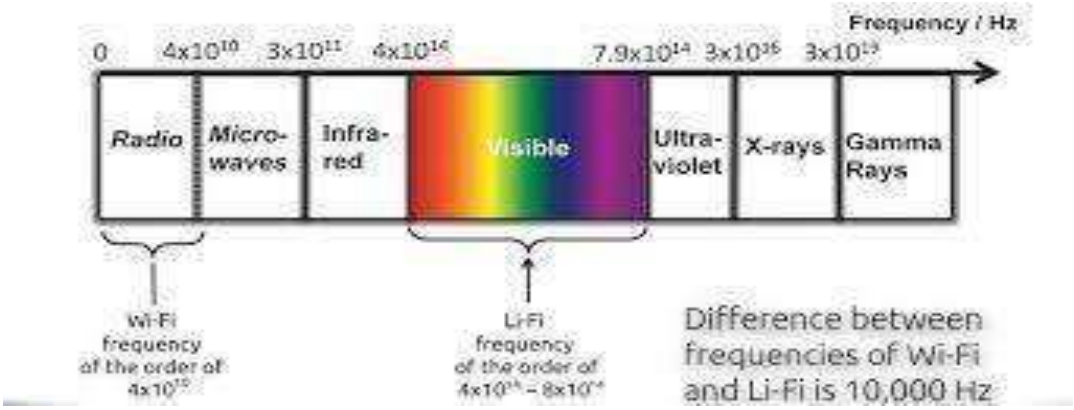


Fig 1: light spectrum for Wi-Fi or Li-Fi

There are light distribution follows:

- Gama rays can't be used as they could be dangerous.
- X-rays have similar health issues.
- Ultraviolet light is good for place without people, but otherwise dangerous for the human body.
- Infrared, due to eye safety regulation, can only be used with low power.

LED:

In this Technology, LED can be used to transfer binary coded information quickly by using visible part of spectrum. Total number of the world's light bulbs is projected at about 14 billion which can be used to obtain data transmission if we replace with LEDs



Speed:

For Wi-Fi we have rate restrictions for data transfer. Although, Li-Fi can offer enormously high-speed of the internet, and we can download massive files in just few seconds of time. The Speed for Li-Fi is 10,000 folds more than Wi-Fi larger than 1 Gbps can be achieved.

How Li-Fi Works?

There working of Li-fi as following. There are two basic components are used: LED Light Source & Light sensor (Photo-detector). The light basis is effort at one end and detector on another end. When LED bulb is on it starts glowing and the light sensor senses the light from light source and receives signals in the form of binary signals i.e. 1 or 0. When some data is transmitted over the network from the internet to the user device, it transmits over the network and flashing of LED bulb is an indication of the message and then photo detector sense light and receive the message and forward to its destination end as shown in.

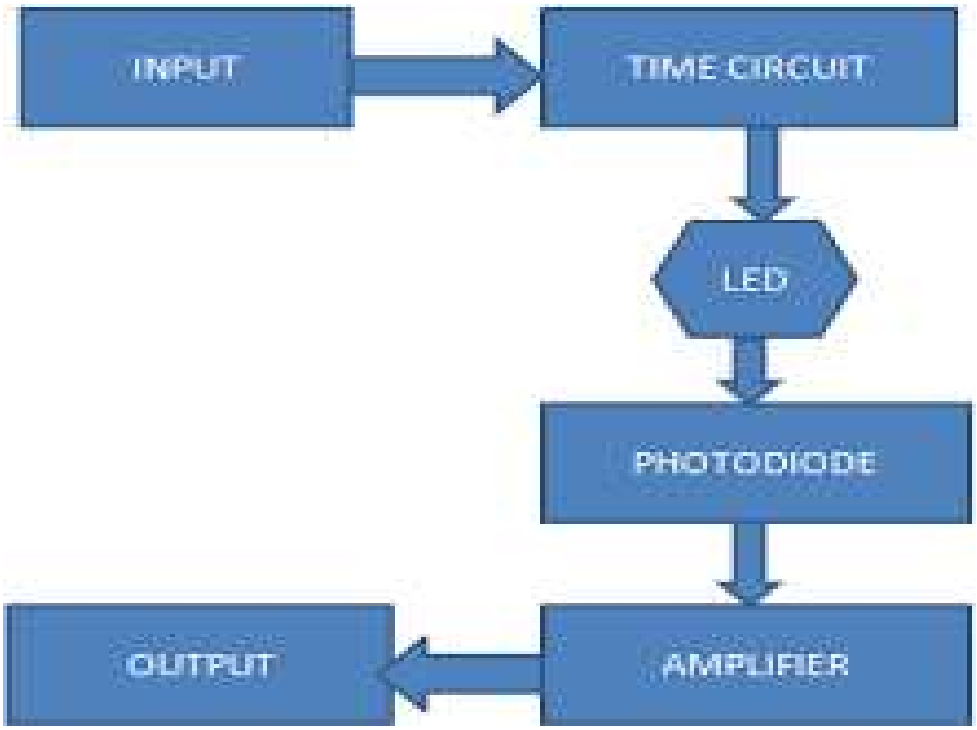


Fig 2:Main component of Li-Fi

- LED Lamp
- Photo Detector(Light Sensor)

- End-user Devices (Laptop, Computer, Mobile etc.)
- Optical Wireless Communication Protocols(OWC)
- Radio Frequency Signal's Amplifier
- Line of Sight Mechanism

More the brighter LED bulb, More frequently data will transmit light signals over the network and highly reliable.

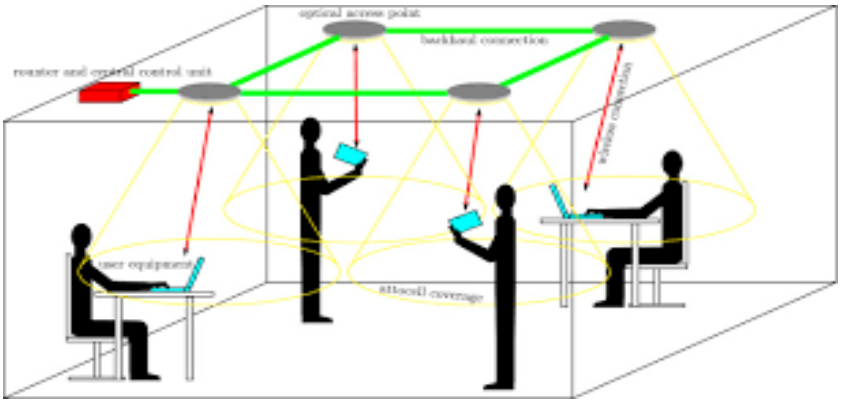
1.1.2 Li-Fi Network

In light- Fidelity might be a wireless communication expertise, that is uses light to communicate information then situation among procedures.

Now this real-world passé Li-Fi is a light communiqué method that is skilled and transferring data at great quickness finished the visible light communication (VLC). On dealings of its completion users, the expertise are related to Wireless Fidelity the key procedural transformation existence that Wireless Fidelity uses to radio rate to communicate information. The area is struck by number of light fixtures, which deliver light for radiance. Every graceful is focused through a Li-Fi modem before a Li- Fi chip and, then, similarly works as per a visual improper location otherwise access point (AP). The optical wireless network positions are related to the core network by great rapidity backhaul networks. The mild fixtures additionally have an included electromagnetic sensor to acquire indicators since the stations.

The revealing light illuminations are controlled at in elevation amounts.

The resultant great radio rate of recurrence flickers which remain abundant developed than the recharge amount of a Laptop display are not evident to resident of the area influence as fine as records dismiss to each light fixture using a quantity of dissimilar methods [6].



1.2 Comparison between LIFI and WIFI

The Li-Fi basically a visible light technology to achieve high speed wireless communication by using visible light to transfer data. Then similarly, to Wi-Fi which utilizes radio waves for transfer data.

Sr No	Parameter	LIFI	WIFI
1	Full Form	Light fidelity	Wireless fidelity
2	Operation	Transmits data using bits with help of light from LED Bulbs	Transmits data with help of radio waves with help of WIFI router
3	Security	Secure as light is blocked by walls.	Not secure as for RF signal dry walls are transparent
4	Interference	Do not have any Interference issue similar to radio waves	Has interference issue from nearby access points (routers)
5	Spectrum	The Spectrum range is 10000 times than Wi-Fi	It has radio spectrum range.
6	Frequency	100 times of Tera HZ	2.4GHz,4.9GHzand 5GHz
7	Speed	Fast speed internet	Comparatively slow speed
8	Cost	Cheap as LED lamps are used.	Quiet expensive.
9	System components	LED bulbs and light Detectors will form complete Li-Fi system.	Routers have to be to be installed devices Like laptops, PDAs, desktops are called as stations.

10	Data transmission rate	Very high rate of data transmission due to visible light spectrum	Transmission rate is slow as compared to Li-Fi as RF is used to communicate.
11	IEEE Standard	802.15.7	802.11b
12	Network Topology	Point To Point	Point To Multipoint

Advantages:

1. It is based on LEDs or other light sources for the transfer of data.
2. The Light has 10000 times wider bandwidth than radio waves.
3. There are data transmission using Li-fi is very cheap.
4. There are billions of light bulbs worldwide; they just need to be replaced with LEDs for proper transmission of data.

Disadvantages:

1. The use of high frequencies (400-800Hz) limits it to very short distances & point to Point communication only.
2. A high speed moving object and to provide data in a remote area where there are trees.
3. They are only works if there is direct line of sight (LOS) between the transmitter and receiver.

Future Scopes

1. We usages MOSFET instead off BJT FOR high switching purposes
2. We usage CMOS sensor instead off LDR for greater response
3. It is possible to achieve more than 10Gbps of speed, theoretically, which would allow a high-definition film to be downloaded in just 30 seconds.

Application:

There are some future applications of Li-Fi:

1. Learning Systems: The Li-fi is the latest technology that can provide fastest speed Internet access.
2. Health Applications: The Li-fi can be used to accessing internet and to control medical equipment.
3. Underwater application: Underwater communication use of radio frequencies (RF) and use of sound waves is impractical due to strong signal absorption. The Li-fi can be working in such cases for underwater communication.
4. Adversity Management: Li-fi can be used as a powerful means of communication in times of disaster such as earthquake or hurricanes & tunnels, common dead zones for most emergency communications, pose no obstruction for Li-Fi.
5. Transportation Management: In transportation motions Li-fi can be used which will communicate with the LED lights of the cars which can help in managing the Transportation in a better method and the mishap numbers can be decreased.
6. Public internet access through street lamps: It means that the any light able to spread internet using visual light communication which helps us to low cost architecture for a hotspot.
7. Harmful Environments: The Li-Fi is a safe another to RF communication in environments such as mines and petrochemical plants which are vulnerable to electromagnetic interferences.
8. Airplanes: The RF waves can cause interference with the radio of the pilot. Consequently to overwhelm this difficult Li-Fi can be used. Likewise the passengers have to pay a huge amount of money for the "service “of dial-up speed Wi-Fi on the plane. Li-Fi could easily solve this problem.

11 Radio Broadcast:- A large amount of power is required by radio masts in order Broadcast and this makes them quite inefficient. LEDs on the other hand require very low power to operate & this means that Li-Fi also uses very little power.

1.1.4 Visible Light Communication (VLC)

VLC is a data communication medium, which uses visible light between 400THz (375nm) as optical carrier for data transmission and illumination. Fast pulses are used for wireless transmission. Communication system components are:

- A high intensity white LED which acts as a communication source.
- A Silicon photo diode which shows good reply to visible wavelength Region.

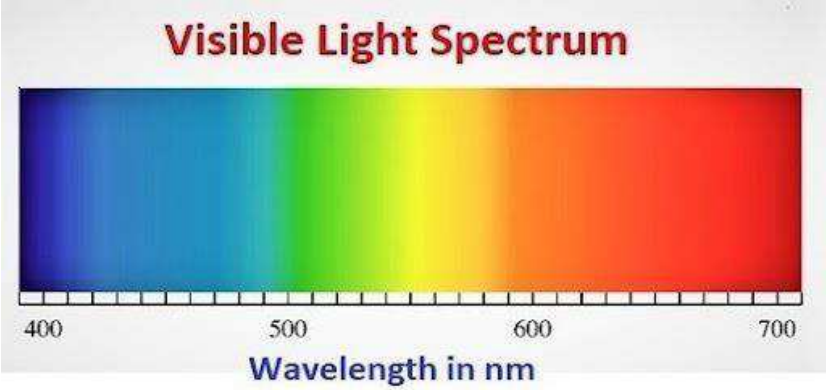


Fig 4 : Visible Light Communication

LED illumination can be used as a communication source by modulating the LED light appears constant to the human eye due to the fast flickering rate. The high data speed can be achieved by using high speed LED‟s and appropriate multiplexing techniques each LED transmits at a different data speed which can be increased by parallel data transmission using LED arrays. Many different reasons exists for the usage of LED light in spite of fluorescent lamp, incandescent bulb etc. which are available [1].

1.1.5 Modulation Technique for Li-Fi

Li-Fi relies on electromagnetic radiation for information transmission. According to On–Off Keying Pulse Position Modulation, Pulse Amplitude Modulation, M-Quadrature Amplitude Modulation, Variable Pulse Position Modulation, Optical Spatial Modulation, Pulse Width Modulation, and Carrier – less Amplitude and Phase Modulation are single-carrier modulation. Orthogonal Frequency Division Multiplexing, Direct Current Optical Orthogonal Frequency Division Multiplexing, Asymmetrically Clipped Optical Orthogonal Frequency Division Multiplexing, Unipolar Orthogonal Frequency Division Multiplexing Pulse-Amplitude Modulated Discrete Multitude Modulation are multi-carrier modulation. Super position OFDM, Hybrid and other MCM are applied in Li-Fi [14].

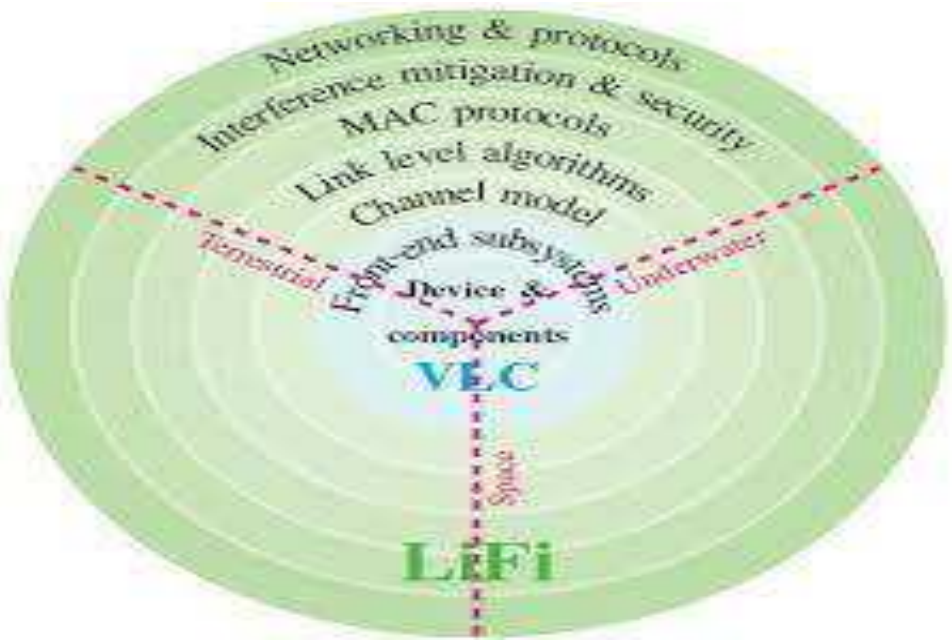


Fig 5 : Modulation Techniques for L-fi

A. Single carrier modulation

The single carrier modulation techniques in Li-Fi are visit appropriate to the low-to-moderate data rate applications. First proposed for IM/DD optical wireless communications in single-carrier modulation techniques is based on infrared Communications. The variety of LED flashes as “on” And “off” states are bits which are modulated into the light intensity. The illumination is controlled by the light intensity between the “on” and “off” states. Modulation techniques
Such as On–Off Keying, Pulse Position Modulation, Pulse Amplitude Modulation, M-Quadrature Amplitude Modulation, Variable Pulse Position Modulation, Optical Spatial Modulation, Pulse Width Modulation, and Carrier – less Amplitude and Phase Modulation are implemented in Li-Fi.

1. On-Off Keying

OOK provides a useful trade-off between system performance and complexness and it is one amongst the well-known and simple modulation schemes .The presence and absence of the carrier wave can be represented digitally by the On-Off Keying techniques. The LED maintains a constant rate. The communication may vary at the time of low dimming levels of the LED bulbs.

Amplitude shift keying

Amplitude Shift Keying modulation technique denotes digital data as disparities in the amplitude of a carrier wave. ASK two different amplitudes of carrier frequency represent zero and one. This can call as On-Off Keying. The amplitude of a wave can be speckled based on the signal. Frequency and phase of the signal in ASK are persistent.

Frequency shift keying

Digital data is transmitted through discrete frequency variations of a carrier signal which is denoted as frequency modulation. FSK allows the changes in the frequency of a carrier signal whenever the digital information is transmitted. Frequency-Shift Keying has two binary states, logic zero (low) and one high and one (high) and a logic zero has described a wave at a selected frequency, and logic one is represented by a wave at a distinct frequency.

Phase shift keying

Phase-shift keying (PSK) is a digital modulation scheme that conveys data by modulating the phase of a carrier wave. In binary PSK signal with message symbol, 1and 0 are transmitted by two different phases two different phases. Symbol „0" is transmitted with 0 phase change in carrier signal and Symbol „1" is transmitted with the phase shift in the carrier.

Binary phase shift keying

BPSK is also usually referred to as Phase reversal keying, or 2PSK.BPSK is the best form of Phase-Shift Keying. BPSK uses two phases are separated by 180° which is called as 2-PSK. The signal state can change from 0 to 1 or 1 to 0, then the phase of the wave changes by 180 degrees. It is capable to modulate at 1 bit /symbol and it is more robust. The constellation diagram for BPSK is two constellation points wholly positioned on the in-phase. No projection on the quadrature.

Quadrature Phase Shift Keying

Quadrature Phase Shift Keying (QPSK) is a form of phase modulation technique, in which two information bits (combined as one symbol) are modulated at once, selecting one of the four possible carrier phase shift states. QPSK allows the signal to carry twice as much information as ordinary PSK using the same bandwidth.

In the QPSK it is based on BPSK is conversion of digital bits into a series of digit stream it convert them into bit pair. These decrease the data bits. The decrease the data bits rate half which allow space for other users Thus in QPSK, the carrier undergoes four changes in phase. Each phase conversion can represent two binary bits of data. The idea of this method is that the carrier can transmit two bits of data instead of one, so the bandwidth of the transmission has effectively doubled. If a digital signal is used as the input to a straight frequency modulator, the output will consist of a sine wave containing two distinct frequencies.

1 M-pulse amplitude modulation

PAM is a modulation technique where the amplitude of pulse varies equivalently with the amplitude of the analogical signal and the width and position of pulse are constant. The parameter M is the range of points in the signal constellation. It should be an even integer. A PAM modulation system in which the signal is appraised at regular intermissions and every sample is formed related to the amplitude of the signal at the moment of sampling .

2 M-quadrature amplitude modulation

QAM is a modulation technique where its amplitude is allowed to vary with the phase. The modulation of the amplitudes of two carrier waves conveys two digital bit streams which is called QAM. The two carrier waves are the identical frequency unit of phase with one another by 90 degrees is called as orthogonally quadrature The main advantage of QAM is blend of two amplitude modulated signals in the identical channel. In QAM, amount of the bandwidth is doubles, thus construction it more efficient. In, QAM there are many various points which will be used, they are a definitive value of phase and amplitude. This is often referred as a constellation diagram. The constellation points are generally organized in an exceedingly square grid. The constellation will have a square with the number of points adequate to an influence of two i.e. 4, 16, 32, 64 i.e. 4 QAM, 16QAM, 32QAM, 64QAM, etc. The process flow to simulate the single carrier modulation.

Pulse width modulation

In modulated signal (PWM), the width of pulses varies proportionally with the amplitude of the al and the amplitude, position of pulses are remains constant. Pulse Width Modulation is an approach of dropping the common power delivered by an electrical signal, by successfully chopping it up into distinct components. The period of time the signal is during in on the state as a percentage of the complete time to finish one cycle is referred to as duty cycle.

Multi carrier modulation

Multi-carrier modulation techniques such as OFDM can convert the frequency discerning fading of the communication channel into a smooth fading which is computationally effective. According to Multi-carrier Modulation includes Orthogonal Frequency Division Multiplexing, Direct Current Optical Orthogonal Frequency Division Multiplexing, Asymmetrically Clipped Optical Orthogonal Frequency Division Multiplexing, Unipolar Orthogonal Frequency Division Multiplexing, Asymmetrically Hybrid Optical Orthogonal Frequency Division Multiplexing, and Pulse-Amplitude-Modulated Discrete Multitude Modulation etc...,

Orthogonal frequency division multiplexing

The encrypting digital data on several carrier frequencies is referred as Orthogonal Frequency Division Multiplexing. OFDM is a frequency-division multiplexing (FDM) is employed as a digital multi-carrier modulation method . In the source, the serial data is transformed into parallel form and then the 16-QAM modulation is applied. IFFT is used to change the frequency into the time domain signal. Next AWGN noise can be passed to the channel. On the receiver side, FFT is applying to convert time domain into frequency domain signal. Demodulation is applied to it. Finally, the recovered signal is found again by passing its parallel to serial converter.

1.1.6 Architecture of Li-Fi

In a layered architecture, Li-Fi consists of three stage application layer, MAC layer, and Physical Layer. IEEE 802.15.7 explains solitary two standards, i.e. PHY and MAC layer.

A. Physical layer

Transmission and Reception, detection of the state of the channel whether it is idle or busy, activation and deactivation of optical transceiver are main responsible of PHY layer. The variants of every operation mode are shown in Table

Operation Mode	Category	Rate
PHY-I	LOW	11.6 Kbps – 266.6 Kbps
PHY-II	MODERATE	1.25 Mbps – 96 Mbps
PHY-III	CSK MODULATION	12 Mbps – 96 Mbps

B. Mac layer

The tasks performed by Medium Access Control [MAC] layer contain Mobility support, Dimming support, , Security support, Schemes for mitigation of flickering, Visibility support, Color function support, VPAN disassociation and association support, Network beacons generation if the device is a coordinator delivering a consistent link between two peer MAC entities. Peer to Peer, star, and broadcast are outlined in MAC layer.

- Peer to Peer- Two devices are communicated, one amongst them is acting as a coordinator.
- Star- Many devices are communicated. One is acting as a coordinator and its castoff as an illumination infrastructure.
- Broadcast-A co-ordinator sends data to many devices. Communication is a unidirectional way.

C. Propagation layer

Line Of Sight and Non-Line Of sight are the characterized by the propagation layer. The unclogged path is obtainable between the source and the destination is a LOS condition. In NLOS channel light is spread via reflections from walls and ceiling

1.2 Problem Statement

There are following issues are related problem statement of Li-Fi.

1. Li-Fi requires line of sight (LOS) and receiving device would not be shift in indoors.
2. A major challenge is how receiving device will transmit data back to transmitter.
3. Data transmission can be easily obstructed by opaque obstacles.

1.3 Choice of topic with Reasons of Li-Fi

1. The Light is useful to transmitting the data in Li-Fi.
2. It is high-speed which is 100 times faster than Wi-Fi, More Effectual, accessibility and security.
3. Light gets stopped up due to any object; therefore it provides greater security may be achieved.
4. Li-Fi is a class in Optical Wireless Communication.
5. A unique feature of Li-Fi is that it combines illumination and data communication.
6. The Aims of Li-Fi few areas, Distance, Cost and Traffic Updates.

2. TECHNICAL KEYWORDS

Wi-Fi	Wireless Fidelity
Li-Fi	Light Fidelity
OWC	Optical Wireless Communication
OFDM	Orthogonal Frequency division multiplexing
PSK	Phase Shifting Keying
QPSK	Quadrature Phase Shifting Keying
QAM	Quadrature Amplitude Modulation
IFFT	Inverse Fast Fourier Transform
SNR	Signal-to-Noise Ratio
FFT	Fast Fourier Transform
AWGN	Additive White Gaussian Noise Channel
BER	Bit Error Rate

3. LITERATURE REVIEW

Farooq Aftab[1] el al, performed a work "Potentials and Challenges of Light Fidelity Based Indoor Communication System" Here author described the paper discusses key potentials of Li-Fi based indoor communication system and point out the challenges which indoor based Li-Fi network is facing under the knowledge of existing research work in the field of Li-Fi.

M. A. Hadi [2] el al, performed a work "Wireless Communication tends to Smart Technology Li-Fi and its comparison with Wi-Fi" Here author described the introduced a technique to cope up with this problem by sending data through an LED light bulb that varies in intensity even faster than the human eye can follow. Tend to the investing the "Li-Fi", or "Light Fidelity". Li-Fi is basically the subset of visible Light Communication (VLC), uses LED bulbs as hot-spots and provides higher data rates than Wi-Fi. It‟s the same idea band behind infrared remote controls but far more powerful. Li-Fi is the term some have used to label the fast and cheap wireless-Communication system, which is the optical version of Wi-Fi.

Akash Gupta, Parul Garg [3] el al, performed a work "Hybrid LiFi - WiFi Indoor Broadcasting System" Here author described this paper we investigate the performance of hybrid Radio Frequency/Visible Light communication (RF/VLC) downlink system as indoor broadcasting system. This combination of RF and VLC systems have a significant merit, since the VLC system provides high data rates along with illumination and RF system provides pervasive coverage. The proposed heterogeneous system will augment the spatial throughput distribution of indoor VLC system.

Iness AHRIZ, Jean-Michel DOUIN [4] el al, performed a work "Performance Evaluations in Optical and Wireless Networks for CONDOR project" Here author described Wireless and optical networks are widely used nowadays. These networks offer a high throughput thanks to their optical link and allow the development of multiuser applications. Because the network performance is an important issue to provide services to a great number of users while assuring users‟ quality of service requirements, CONDOR (Contribution à la Diffusion de l‟histOiRe du traitement de l‟information à l‟aide du réseau de demain) project aims to evaluate the wireless and optical networks‟ performances in terms of link quality, throughput, jitter and delay. Our

results show that a high throughput in optical and wireless networks supports a big load through the launched mobile applications while P2P wireless network connections upset some video applications.

Maged A. Esmail, Habib A. Fathallah [5] el al, performed a work "Indoor visible light communication without line of sight: investigation and performance analysis" Here author described in this paper, we investigate the possibility to establish VLC links in shadowed areas, i.e., where the line of sight is blocked or unavailable. First, we study the system performance in terms of received power, SNR, BER, and rms delay spread.

Wentao Zhang, Xiaohui Chen, Zihao Yu, Zhiyuan Li, Weidong Wang [6] el al, performed a work "Design and realization of indoor VLC-Wi-Fi hybrid network" Here author described Indoor wireless communication networking has received significant Attention along with the growth of indoor data traffic. VLC (Visible Light Communication) as a novel wireless communication technology with the advantages of a high data rate, license-free spectrum and safety provides a practical solution for the indoor high-speed transmission of large data traffic. However, limited coverage is an inherent feature of VLC. In this paper, we propose a novel hybrid VLC-Wi-Fi system that integrates multiple links to achieve an indoor high-speed wide-coverage network combined with multiple access, a multi-path transmission control protocol, mobility management and cell handover. Furthermore, we develop a hybrid network experiment platform, the experimental results of which show that the hybrid VLC-Wi-Fi network outperforms both single VLC and Wi-Fi networks with better coverage and greater network capacity.

Xiping Wu, Majid Safari, Harald Haas [7] el al, performed a work, "Access Point Selection for Hybrid Li-Fi and Wi-Fi Networks" Here author described Hybrid light fidelity(Li-Fi) and wireless fidelity(Wi-Fi) networks are an emerging technology for future indoor wireless communications. This hybrid network combines the high speed data transmission offered by visible light communication (VLC) and the ubiquitous coverage of radio-frequency (RF) techniques. While a hybrid network can improve the system throughput and user experience, it also challenges the process of access point selection (APS) due to the mixture of heterogeneous access points (APs). In this paper, the differences between homogeneous and heterogeneous networks regarding APS are discussed, and a two-stage APS method is proposed for hybrid Li-Fi/Wi-Fi networks.

Neha Chaudhary, Luis Nero Alves, Zabih Ghassemblooy [8] el al, performed a work "Current Trends on Visible Light Positioning Techniques" Here author described The paper briefly reviews conventional positioning methods based on Rx signal strength (RSS), time difference of arrival (TDOA) and angle of arrival (AOA). Then it focuses on the current research trends, relying on the machine learning techniques, sensor fusion and communication requirements.

Nasir Saeed, Abdulkadir Celik [9] el al, performed a work "Underwater optical wireless communications, networking, and localization: A survey" Here author described challenges for UOWCs and significantly reduce the attainable communication ranges which necessitates efficient networking and localization solutions. Therefore we provide a comprehensive survey on the challenges, advances and prospects of underwater optical wireless networks (UOWNs) from a layer by layer perspective which include physical layer, data link layer, Network layer, Transport layer, Application layer.

Damanjeet Kaur, Abirbhav Mukherjee [10] el al, performed a work, "Simulation of Dimmer Circuit for Daylight Harvesting" Here author described in this paper, a fuzzy based dimmer circuit model for daylight harvesting is proposed. The model incorporates the variable daylight intensity and number of occupants in a room. The dimmer circuit controls the switching ON and Off LEDs (light emitting diode) in a room corresponding the daylight intensity and occupants while the required level of illumination is maintained. The uncertainty in input variables are incorporated in the model with the fuzzy logic. The developed model is simulated in MATLAB and LABVIEW environment. The developed model is tested for different situations

Sergio Sandoval-Reyes [11] el al, performed work "Transmission and Reception of Images via Visible Light" Here author described In this paper an application based on VLC using OOK (On-Off Keying) modulation, to transmit color images from a Raspberry Pi computer (using Python as the programming language), and several modules (LEDs and a sensor light) from Little Bits.

Vyom Shah , Disha Purohit , Prajakta Samant [12] el al performed work "2D Image Transmission using Light Fidelity Technology" Here author described In this paper, Wi-Fi deals with wireless coverage within premises, whereas Li-Fi is perfect for high compactness wireless data coverage in controlled area and for mitigating radio interference issues. In Li-Fi basically we focus to transmitting multimedia data between two terminals using LEDs.

Aishwarya Hamand, Sunil Kuntawar [13] el al performed work "An Approach towards High-Speed Communication Using LI-FI Technology" Here author described In this paper designed a prototype Li-Fi system. We successfully achieved the output in the form of audio, data and b/w image. We create bride with IOT, so we can access the LI-FI technology from anywhere.

Ms. Bhagyashree M. Mishras, Dr. V. M. Deshmukh [14] el al performed work "Image Encoding & Decoding Using Base64 Technique and its Wireless Transmission Using Li-Fi"Here author described in this paper Li-Fi is one of the advanced and fastest technologies among other available data transmission technologies in the world of data communication. The high bandwidth and immunity to interference ability of Li-Fi makes it unique from other available wireless technologies. It could be used in areas where high data transfer is much required and other wireless technologies are restricted due to their hazardous signal radiations. It could be useful in variety of application including audio transmission, video transmission, text transmission and image transmission. Li-Fi communication is also called as the Visible Light Communication (VLC) since we make the use visible light for transmitting the data from transmitter to receiver. In this article a prototype is designed to transfer a 2D image using UART serial communication from one PC to another PC using VLC.

Filip Čertík [15] el al performed work "USING MATLAB TOOLS FOR SIMULATION OF THE OPTICAL TRANSMISSION MEDIUM" Here author described in this paper includes a calculation part of nonlinear effects and a simulation part where the signal is examined in a real - time. This program deals with different types of modulation techniques and with characteristics of the optical environment.

4 TECHNICAL DETAILS

HARDWARE REQUIREMENT

System: AMD E1- 1200 APU with Radeon (tm) HD Graphics 1.40GHz Hard Disk: 250GB
RAM: min 4.00GB
Monitor: 15"""" black color Mouse: Logitech

SOFTWARE REQUIREMENT

Operating System: Windows 10
Front-end: MATLAB R2017a
Back-End: Simulink

5 OBJECTIVES

1 To study Li-fi information achieves much faster rate of communication with direct line of sight.

2 To study various points to point to point communication improve wireless network performance.

3 To study various optical communication technique to communicate between sender and Receiver.

6. BASIC SYSTEM ARCHITETURE

6.1 Outline of System

1. Transmitter
2. Receiver
3. Modulation Technique

Explanation of Following System work

The system architecture consists of a transmit section and a receive section

Transmitter

The transmit section consists of the data as input the user sends image as converts to modulation technique Q PSK, 4QAM,16QAM,32QAM, 64QAM combine OFDM modulation based on data generate a stream 1s and 0s thereby encoding the data in binary.

Receiver

The Receiver section consists of the data as output decoding the received data is done at the receiver computer using MATLAB R2017a program. The received image as Q PSK, 4QAM, 16QAM, 32QAM modulation technique. The IFFT and FFT of the AWG channel use transmit data.

Modulation Technique (OFDM)

The demand for high-speed wireless technology and limited RF signals bandwidth is increasing day by day. There are new uses are emerging, not just in the wired systems, but also in the wireless mobile systems. At present-day, only low rate data services are available for mobile applications.

Though, there is a demand for high data rates for multimedia applications. OFDM is a technique of converting digital signal data on multiple carriers frequency, and it takes several low data rate frequency channels, and then combined them into one high data rate frequency channel.

6.2 System Architecture

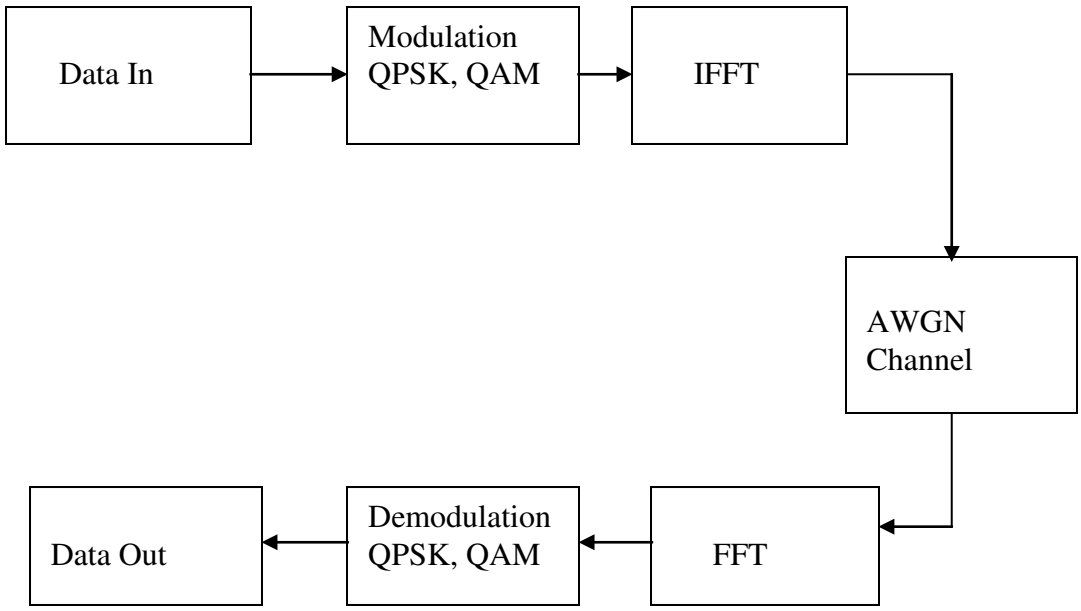


Fig 6: Basic Simulation platform of optical transmission system transmitter and receiver.

7. DESIGN AND ANALAYSIS

7.1 Methodology

The methodology of Light Fidelity network uses visible light communication for ending data, it is necessary to modulate the data into a signal which can be transmitted. These signals consist of light pulses. Some common modulation techniques used in Li-Fi is discussed below.

7.1.1 Modulation Technique

In the digital modulation techniques generally used for Li-Fi are summarized, and some special issues and requirements are discussed. In principle, Li-Fi also relies on electromagnetic radiation for information transmission. There are two Modulation Technique Single carrier modulations and other of Multi-carrier Modulation. In the uses of Li-Fi is Multi-carrier Modulation Technique.

7.1.1.1OFDM

Orthogonal frequency-division multiplexing (OFDM) is a modulation technique of encoding digital data on multiple carriers frequencies. This remains a new method to communicate in which an added element is added to square 2D amplitude/phase modulation (APM) techniques such as quadrature amplitude modulation (QAM) and pulses shift keying (PSK). Not like the modern OFDM modulation technique, the Sub-carrier Index Modulation Orthogonal frequency-division multiplexing technique splits the serial bit stream into two bit sub-streams of the same length. The important knowledge is to use the sub- carrier index to convey information to the receiver. The Orthogonal allows for efficient Modulator and demodulation implementing using the FFT algorithm on receiver side, and other sender side the time computer the IFFT or FFT transform has to take the time for each side.

7.1.1.2QAM

In this digital modulation processes connected intimate of analog modulation approaches extensively used in modern communication to transmit information.as a QAM is a Data transmission as a 16QAM, another transfer to 64QAM, 64QAM .It is higher data rate can be achieved but at the cost of the margin many data migrate between the difference order of QAM, 16QAM,32QAM etc. dependent upon link condition. Then a QAM order increase so the increase so distance between the differences and there is a higher possibility of data error being introduced. There are shown constellation diagram of QAM.

7.1.1.3QPSK

In the QPSK it is based on BPSK is conversion of digital bits into a series of digit stream it convert them into bit pair. These decrease the data bits. The decrease the data bits rate half which allow space for other users Thus in QPSK, the carrier undergoes four changes in phase. Each phase conversion can represent two binary bits of data. The idea of this method is that the carrier can transmit two bits of data instead of one, so the bandwidth of the transmission has effectively doubled. If a digital signal is used as the input to a straight frequency modulator, the output will consist of a sine wave containing two distinct frequencies.

7.1.2 Channel Model

Additive White Gaussian Noise (AWG) is the information random radio noise characterized by a wide incidence range in regard to a signal in a communications channel. Average Signal-to-Noise Ratio (SNR). In this optical wireless communication system uses the AWG channel model in which the only impairment to communicate is a linear addition of wide band or white noise with a constant spectral density, and a Gaussian distribution of amplitude the influence of Signal-to-noise ratio (SNR) of communication signal and channel coding on the Bit-Error Rate Performance is performed using prototype. The relative position of transmitter with respect to receiver on the improve performance in optical wireless communication.

7.1.3 Comparison between Wi-Fi vs. Li-Fi

Parameter	**Li-Fi**	**Wi-Fi**
Speed	1-3.5 Gbps	54-250 Mbps
Range	10 Meters	20-100 Meters
IEEE Standards	802.15.7	802.11b
Spectrum Range	100000 times than Wi-Fi	Radio spectrum Range
Network Topology	Point To Point	Point To Multipoint
Data Transfer Medium	Used light as a carrier	Use radio spectrum
Frequency Band	100 times of Tera Hz	2.4 GHz

7.2 Proposed Algorithms

Algorithm 1: The simulation process for BER Analysis.

1. Initialize the system parameters, and let t = 0, n = 0, N = 106.
2. While (t ≤ N) do
3. Compute the channel gain h by using (7).
4. Randomly generate an OOK modulated signal X = P ∗ (rand(1, 1) > 0.5).
5. Generate a random number Z1 for the
6. input-dependent noise, which follows N(0, ς2σ2).
7. Generate a random number Z0 for the
8. input-independent noise, which follows N(0, σ2).
9. Compute y = rh X + √rhXZ1 + Z0.
10. Compute the optimal detection threshold η∗ by using (14).
11. If y ≥ η∗ then
12. n = n + 1;
13. End If

    12. t = t + 1;

14. End While
15. Compute the BER by using BER = n/N.

7.3 Data Flow Diagram

The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to denote a system in terms of input data to the system, various handling carried out on this data, and the output data is generated

By this system.

The data flow diagram (DFD) is one of the record essential Modeling tools. It is used to model the system components. These com Opponents are the system process, the data used by the process, an external

Entity that interacts with the system and the information flows in the system. DFD demonstrations how the information moves through the system and how it is modified by a series of transformations? It is a graphical technique that Depicts information flow and the transformations that are applied as data Moves from input to output.

7.3.1 DFD Level 0

The system designer makes context level DFD, which shows only the interaction between system and system environment. According to follow diagram after node deployment in system, data can be sender to receiver node.

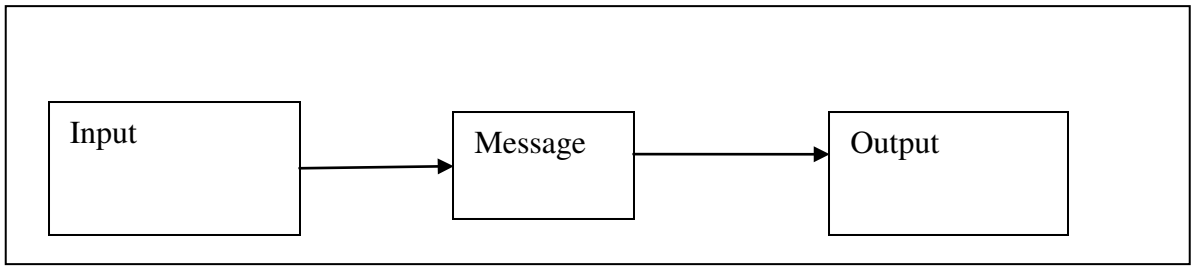
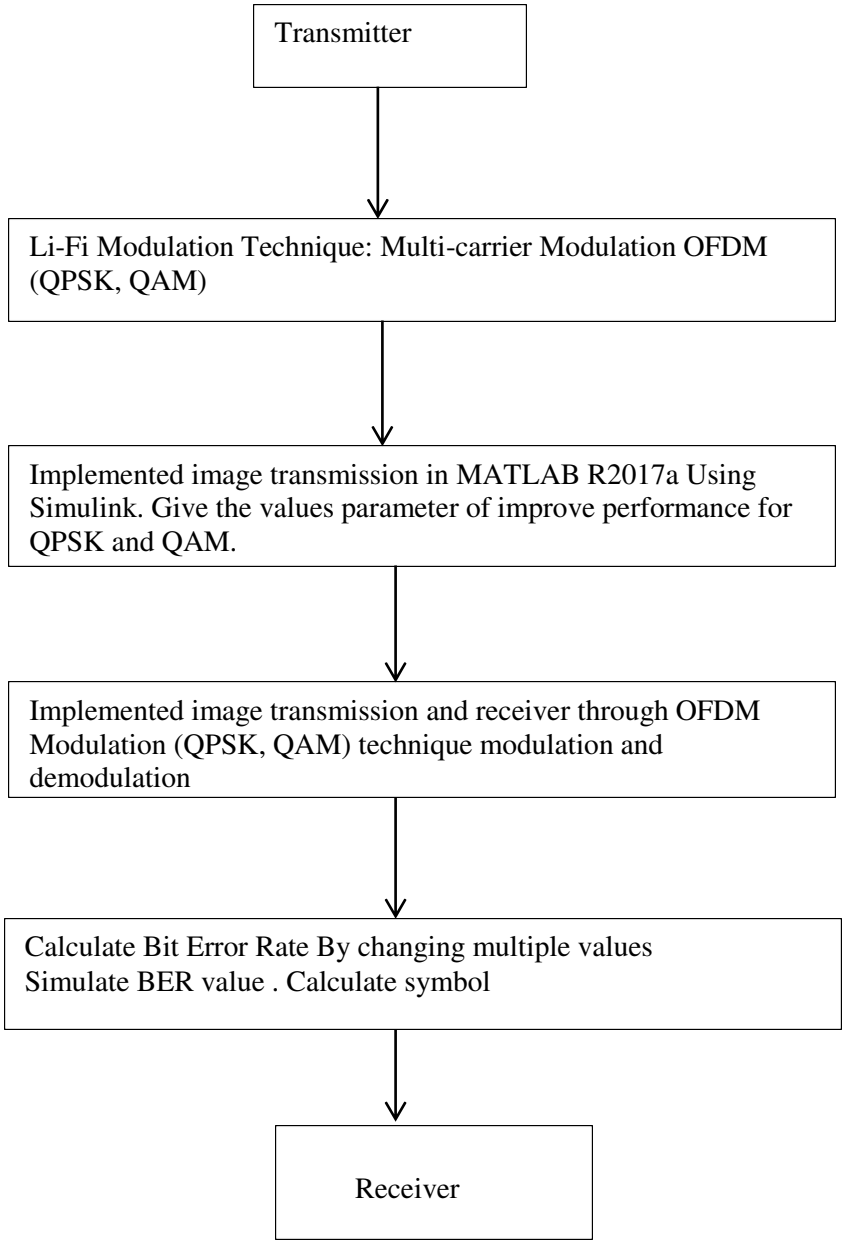


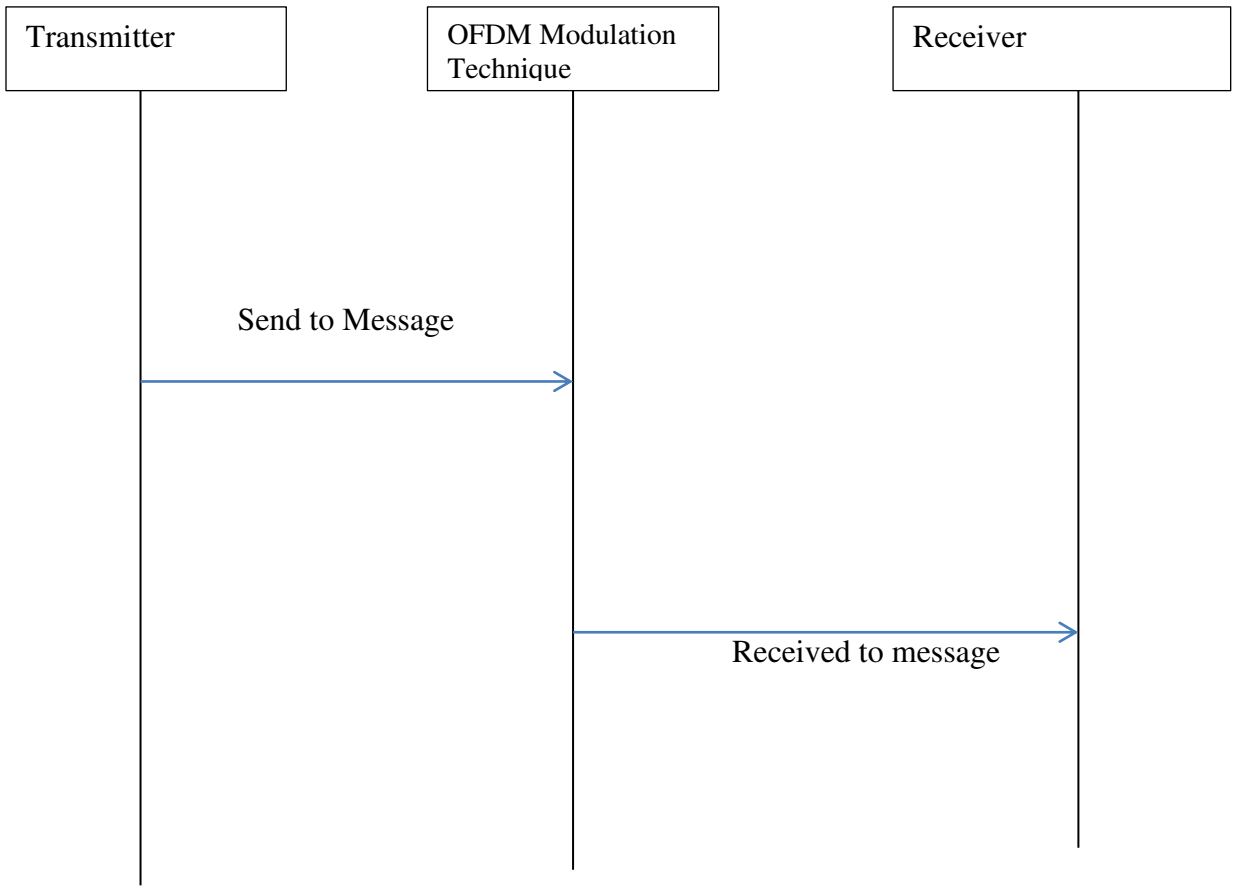
Fig 7: Basic Data Flow Diagram

7.3.2 DFD Level 1



7.4 Sequence Diagram

A sequence diagram is a designed representation of behavior as a series of Sequential steps over time. It is used to describe work flow. Sequence diagram is basically interaction diagram. Following sequence diagram shows sequence of different steps involved in various functionalities throughout the system.



8. IMPLEMENTATION

8.1 Implementation Information

In Light Fidelity network understanding concept of optical communication network. However,, to clear study made far to compare the performances of WI- FI and Li-Fi models with OFDM as a common statistical multiplexing scheme. To understand the impact of OFDM on Wi-Fi and Li-Fi models. A simple communication model is taken and its performance improvement in light fidelity network studied with Li-Fi and Wi-Fi configuration parameters such as BER and SNR of both the schemes are compared. MATLAB R2017a software is used for the implementation of the model. The following sections describe the details of the model.

Transmitter Section

The following steps are followed in the transmission side

Step1: The input data is a JPEG/ BMP image. The image is converted into binary data bits with the help of the serial to parallel converter.

Step 2: The Converted data is then provide for into the modulation technique where there are 4 types of modulation schemes 1.PSK, 2.QPSK, 3.QAM i.e. 4QAM, 32QAM, 64QAM embedded. Anyone of the scheme can be chosen. This Modulator is adaptable for both Light and RF signal. Based upon the signal transmitted the modulation scheme is adopted. Compare to other modulation techniques, the bit error rate for BER system decrease monotonically and produce a smaller bit error rate than any other modulation scheme. Therefore the QAM is chosen in our experiment. However for comparisons all modulation schemes.

Step 3: A Hybrid Inverse Fast Fourier Transform (IFFT) converts the frequency domain data set into samples of the corresponding time domain representation of the data. Specifically, the IFFT is useful for OFDM because it generates samples of a waveform with orthogonal frequency components that satisfying orthogonal conditions.

Step 4: Adding cyclic prefix is just prefixing of a symbol with a repetition of the end and also eliminates the inter symbol interference from the previous symbol.

Receiver Section

The following steps are followed in the Receiver side

Step 1: Removal of cyclic prefix portion which is added in the transmitter side is removed in this block in order to obtain the original transmitted image.

Step 2: A hybrid Fast Fourier transform (FFT) algorithm converts a signal from its original domain (often time or space) to a representation in the frequency domain and vice versa.

Step 3: Demodulate the signal to baseband (RF/Light)

Step 4: Convert the parallel data stream into the serial data and thus create the OFDM signals by sequentially and reconstructs the original image.

Channel model

Additive White Gaussian Noise (AWG) is the information random radio noise characterized by a wide incidence range in regard to a signal in a communications channel. Average Signal-to-Noise Ratio (SNR). In this optical wireless communication system uses the AWG channel model in which the only impairment to communicate is a linear addition of wide band or white noise with a constant spectral density, and a Gaussian distribution of amplitude the influence of Signal-to-noise ratio (SNR) of communication signal and channel coding on the Bit-Error Rate Performance is performed using prototype.

The relative position of transmitter with respect to receiver on the improve performance in optical wireless communication.

8.2 Screenshot

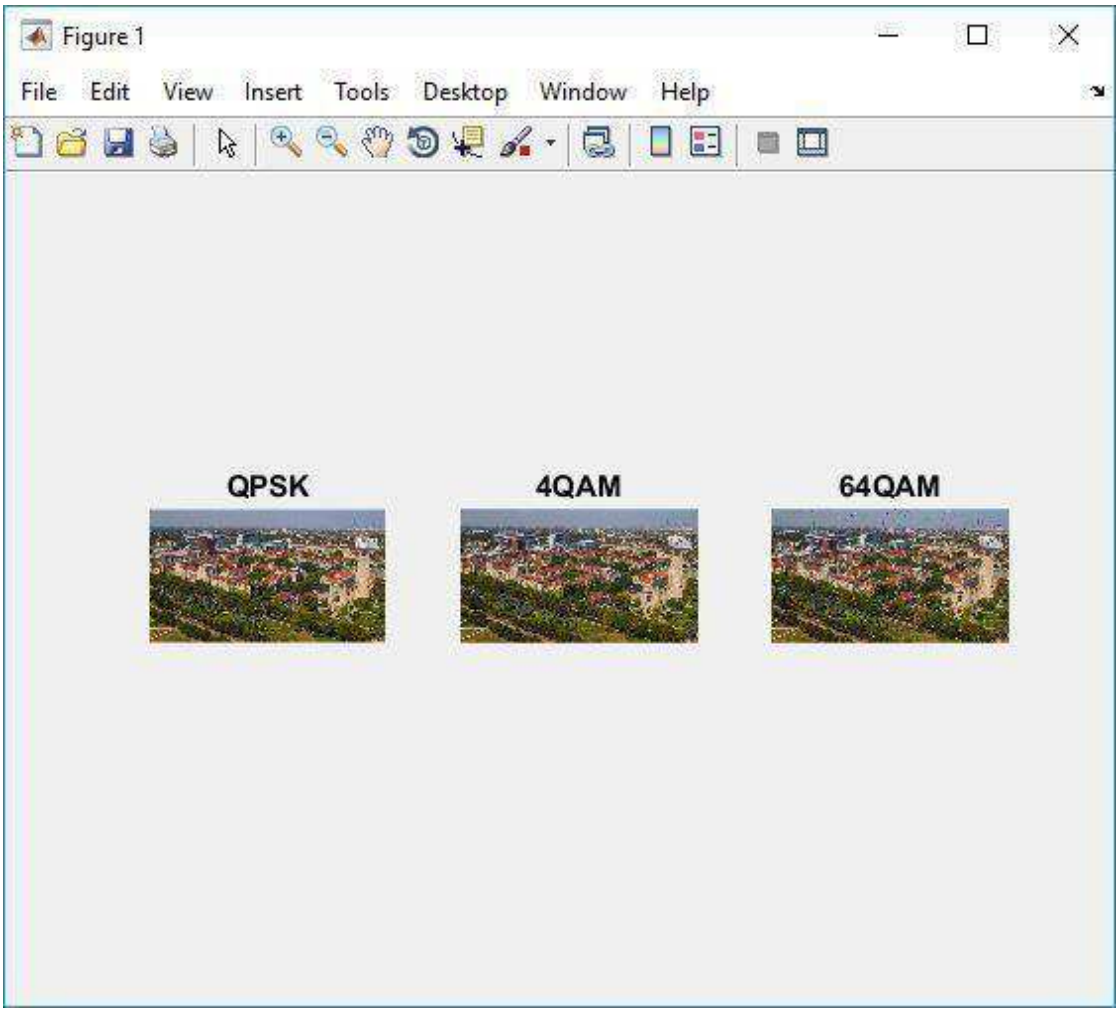


Fig 1: Implementation Module OFDM Simulate combine QPSK with 4QAM, 64QAM

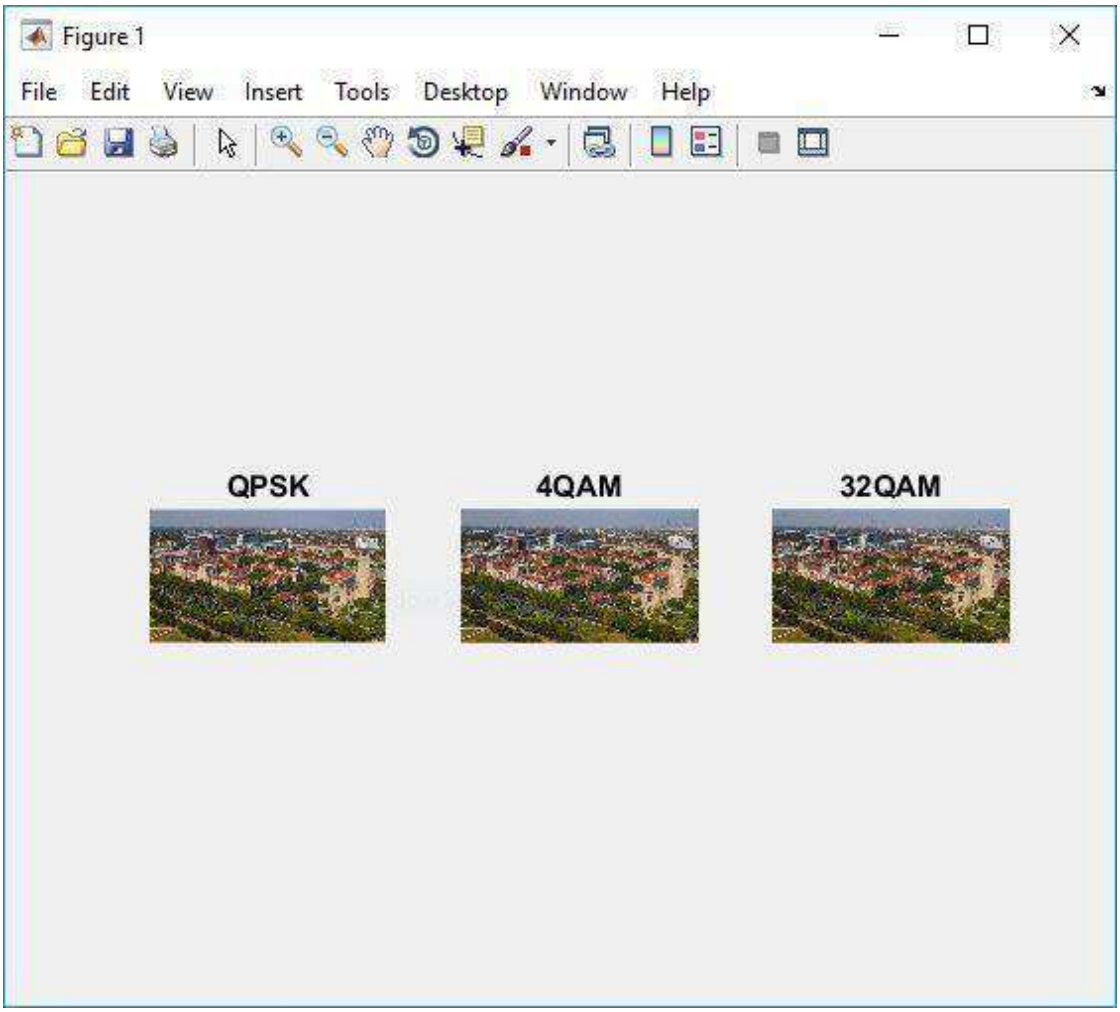


Fig 2: Implementation Module OFDM Simulate combine QPSK with 4QAM, 32QAM

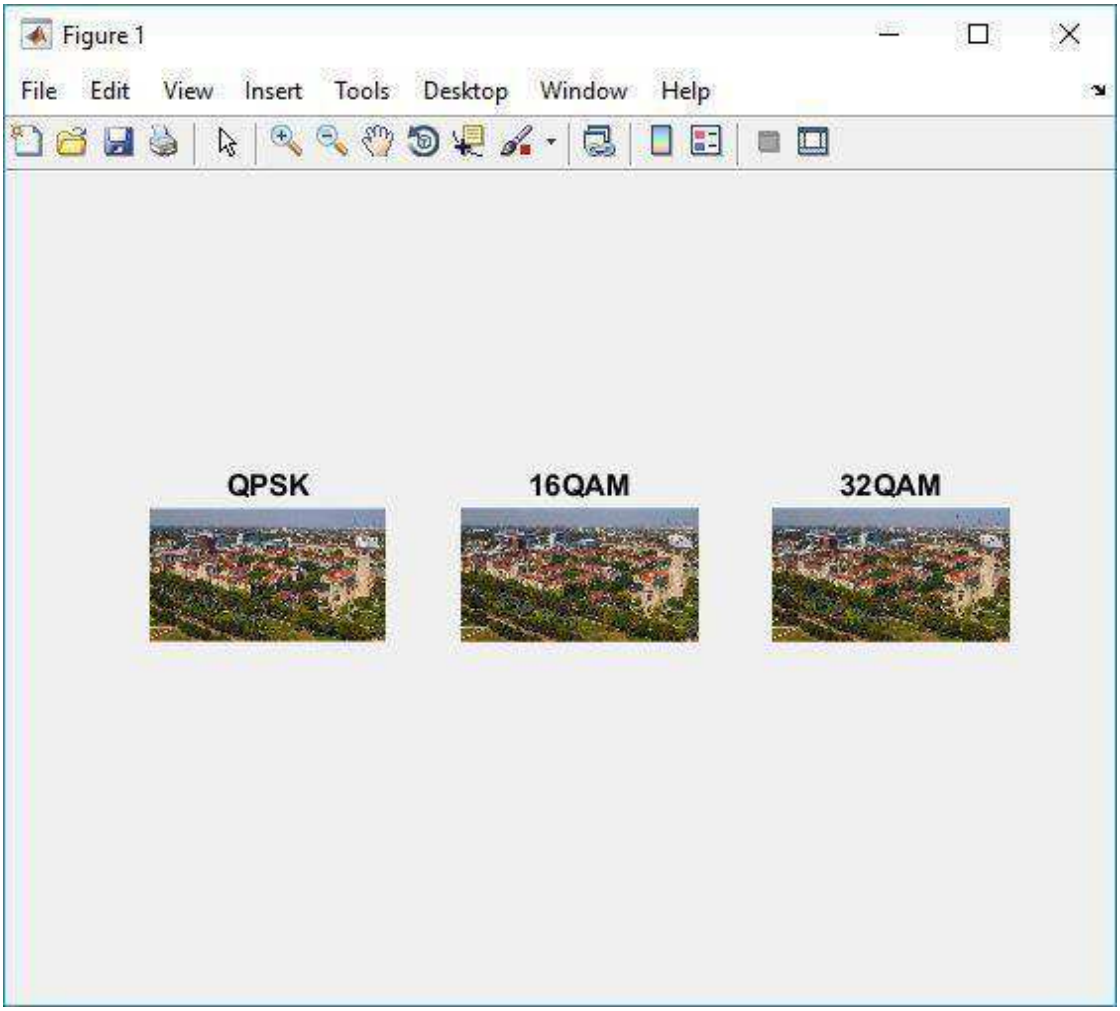


Fig 3: Implementation Module OFDM Simulate combine QPSK with 16QAM, 32QAM

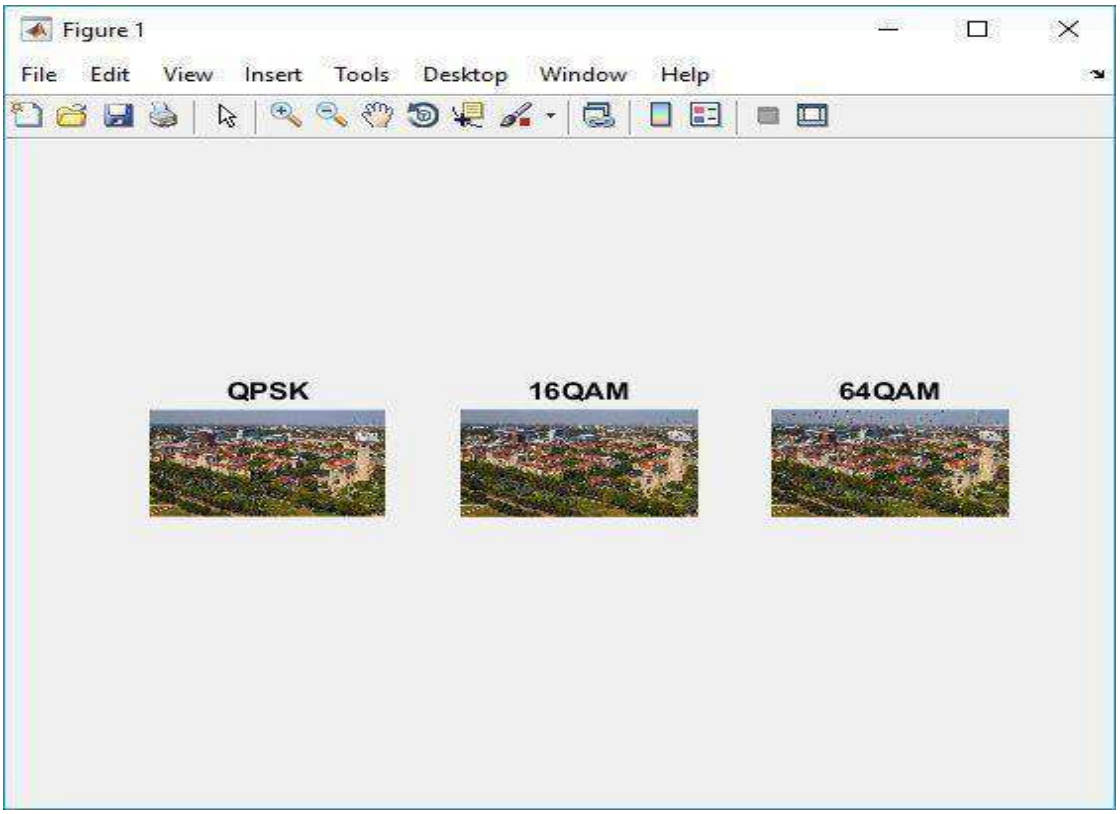
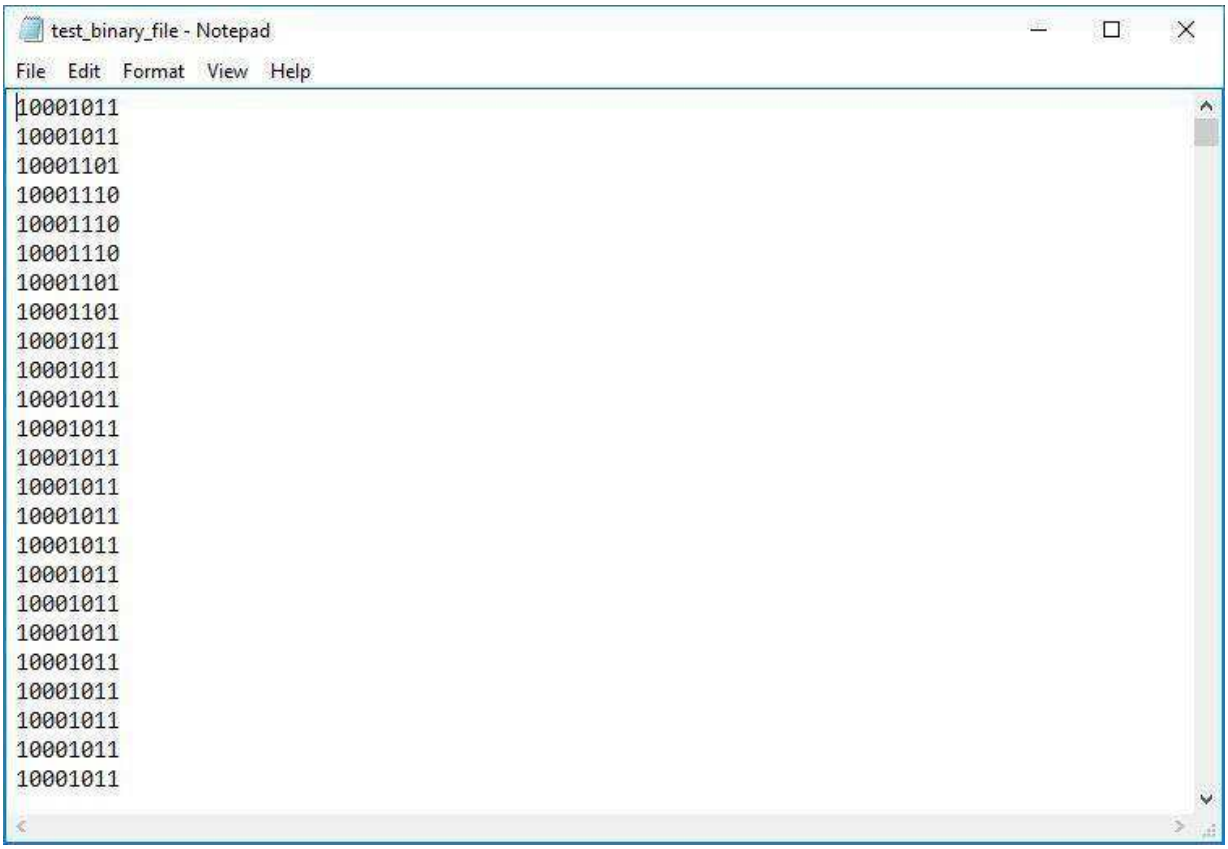


Fig 4: Implementation Module OFDM Simulate combines QPSK with 16QAM, 64QAM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9. RESULT AND DISCUSSION

The image is given as the input to the OFDM Modulation technique form communication Model where the Radio Frequency based OFDM system and optical communication based OFDM system combined in a hybrid Model. Before transmitting the image the type of network is to be choosing by the user .The model asks the Bellow said configuration details based upon the network to be transmitted. Then it generates the results for the image that is given as input based on the selected modulation technique and transmit to output of demodulate the image as combine QPSK and 4QAM,32QAM,64QAM modulation technique such as IFFT and FFT.

All the experiments are carried out using MATLAB R2017a.The optical communication there improve network performance by using OFDM Modulation technique in Light fidelity network.

Parameter for QPSK and QAM

A. Bit Error rate

The number of bit errors per unit time is denoted as Bit Error Rate. The error that occurs in transmission system is referred to as Bit Error rate. The number of errors that occur in a string of a specified number of bits. Bit Error Rate is also called as Probability of Error (POE). The bit error rate can be determined as

$$BER = \frac{\text{Error}}{\text{Length of bit}}$$

Bit Error Rate can be reduced by Lower order modulation and reduced bandwidth.

- Lower order modulation schemes will be employed, but it leads to fewer data throughput.
- Bandwidth ends up in the lower level of noise and thus signal to noise ratio (SNR) will progress.
- The BER is the amount of bit error per unit time. In noise ratio channels BER is frequently as a purpose of the controlled carrier-to-noise ratio measure denoted Eb/N0.

There are Symbol Error Rate (SER) is the probabilities of receiving a symbol and bit in error, respectively.

$$SER = \frac{\text{No of symbols in Error}}{\text{Total no Transmitted Symbol}}$$

B. Additive White Gaussian Noise channel

The AWGN is noise which can be added to the channel. Additive as a result of the arriving signal is equal to the transmitted signal, White as a result of rent less power spectral density, Probability distribution function is Gaussian, and Noise distorts the received signal. Deep space communication links and satellites communications are applicable to the AWGN model.

Test Configuration

Parameter and performance Calculation

Image Size	250*250
IFFT Size	16
Number Of Size	4
Modulation technique	QPSK,QAM
Peak Power Cliping	10dB
SNR	20dB

10 CONCLUSION AND FUTURE WORK

In this work we have implemented a simple OFDM based communication model with help of modulation technique (QPSK, QAM (4, 16, 32, 64)) with both radio frequencies based OFDM system and light fidelity network using the MATLAB R2017a.The output obtained were analyzed by giving various inputs and concluded that the Light Fidelity based OFDM system is more efficient than the Radio Frequency (RF) based OFDM system in data transmission with minimum amount of data loss comparatively. Since the Bandwidth of the channel model is high, the data transfer is considerably good. The Additive White Gaussian Noise (AWGN) channel for a network is the next challenge in this area. The channel is the next area to be concentrated and how the both Li-Fi and Wi-Fi Networks can be combined and new protocol for handover of these two networks can be designed. In this implemented work we have only concentrated on the images with help of OFDM modulation technique (QPSK, 4QAM, 16QAM, 32QAM, and 64QAM).

In future, the system can be adopted all kind of inputs such as, text, audio and video.

Bibliography

[1] Kartik Wate & Neha Mattani, Aditya Gole."Visible Light Communication (Li-Fi)." IJERT Vol. 2 Issue10, October – 2013.

[2] Ravi Prakash1, Prachi Agarwal. "The New Era of Transmission and Communication Technology: Li-Fi (Light Fidelity) LED & TED Based Approach." IJARCET Vol. 3 Issues 2, Feb2014.

[3] Shamsudheen P. & Suresh Kumar .E. "Performance Analysis of Visible Light Communication System for Free Space Optical Communication Link."ICETEST-2015.

[4] Hemalata Chavan & Aparna Joshi. "Li-Fi–The Future Technology in Wireless Communication." In ICI2IM2016

[5] Shirke Suraj & V, Dalvi Sagar. "Li-Fi – Data Transmission through Light." Vol. 4, Issue 3, March2016.

[6] H.A. Hadi. "Wireless Communication tends to Smart Technology Li-Fi and its comparison with Wi-Fi."AJERVol.5Issue- 5,2016

[7] Parth Vora, Paras Bhanushali & Prof Dr. Prerna Goswam. "Li-Fi – A Revolution in the field Of WirelessCommunication". International Journal Of Advance Research in field Engineering. Vol .5 April2015.

[8] Xiping Wu, Dushyantha Basnayaka, Majid Safari and Harald Haas "Two-stage Access Point Selection for Hybrid VLC and RF Networks" IEEE2016.

[9] Iness AHRIZ, Jean-Michel DOUIN, Frederic LEMOINE and Anne WEI. "Performance Evaluations in Optical and Wireless Networks for project."2018.

[10] Nassir Saeed ,& Abdulkadir & Celik Taraq."Under water optical wireless communications, networking, and localization: A survey." Ad hoc Network June2019.

[11] Yunlu Wang, Dushyantha A.Basnayaka, Xiping Wuand Harald Haas "Optimization of Load Balancing in Hybrid Li Fi/RF Networks." IEEE2017.

[12] Pavol Šalík, Rastislav Róka, Tomáš Gorazd, "Simulation Platform of Optical Transmission System In Matlab Simulink."ScienceDirect2018.

[13] Shubham Chatterjee, Shalabh Agarwal, Asoke Nath, "Scope and Challenges in Light Fidelity(Li-Fi) Technology in Wireless Data Communication." IJIRAE Issue 6, Volume 2 June 2015.

[14] S.ArunMozhi Selvi, Dr.R.S.Rajesh "Performance of OFDM Modulation Schemes in Wireless and VLC System." IJIACS 2018.

[15] Hanna Abumarshoud "Dynamic Multiple Access Configuration in Intelligent Li-Fi Attocellular Access Points" IEEE 2019.

[16] Ms. Bhagyashree M. Meshram "Image Encoding & Decoding Using Base64 Technique and It's Wireless Transmission Using Li-Fi" IJFRCSCE April 2018.

[17] Vyom Shah , Disha Purohit , Prajakta Samant , Ruhina Karani "2D Image Transmission using Light Fidelity Technology" IJIACS April 2015

Appendix A

Acronyms

Wi-Fi Wireless Fidelity

Li-Fi Light fidelity

OWC Optical Wireless Communication

OFDM Orthogonal Frequency division multiplexing

PSK Phase shift keying

QPSK Quadrature Phase Shift Keying

QAM Quadrature Amplitude Modulation

IFFT Inverse Fast Fourier Transform

SNR Signal-to-Noise Ratio

FFT Fast Fourier Transform

AWGN Additive White Gaussian Noise channel

BER Bit Error Rate

Appendix B

Paper Published on Current Work

Paper published in IJRERD (International Journal of Recent Engineering Research and Development), Volume: 04, Issue: 10, Oct-2019 by Ms. Akshata Sunil Jadhav, Prof. Ms.Nimisha Deval, Prof. P. A. Satarkar on **"A Review Paper on Light Fidelity Network".**

Paper published in JETIR (Journal of Emerging Technologies and Innovative Research) Volume: 07, Issue: 03, March-2020 by Ms. Akshata Sunil Jadhav, Prof. Ms.Nimisha Deval, Prof. P. A. Satarkar on **"Performance Improvement Using Light Fidelity Network".**

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
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Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: M.E. Computer Science & Engineering Programme Code: 1-1408968341			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Dissertation Phase I : Synopsis Submission Seminar		01
2.	Dissertation Phase II : ICA		
3.	Dissertation Phase II : Progress Seminar		03
4.	Dissertation Phase III : Progress Seminar		
5.	Dissertation Phase IV : Final presentation and submission of report		
6.	Final Submission of the Dissertation and Viva-voce		

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PRINCIPAL,
College of Engineering
PANDHARPUR

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COLLEGE OF ENGINEERING, PANDHARPUR
Gopalpur-Ranjanroad, Gopalpur, P.B. No. 54, Tq- Pandharpur-413 304, Dist:- Solapur (Maharastra)
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Department of Computer Science and Engineering

List of Students Undertaking

Dissertation Phase-I: Synopsis Submission
Dissertation Phase-II: ICA
Dissertation Phase-II: Progress Seminar

Class: M. E -II

Academic Year-2019-20

Roll. No.	Name of Student
1	Ms. Kachare Sonali Satish

P.G. Co-ordinator

HOD

Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur

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पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)
दूरध्वनी : ०२१७-२७४४७७१/७२/७३/ (११ लाईन्स), फॅक्स : ०२१७-२३५१३०
संकेतस्थळ: http://su.digitaluniversity.ac/www.sus.ac.in ई-मेल: bcudpgbutr@sus.ac.in

NAAC Accredited 2015
'B' Grade (CGPA 2.62)



Ph.D Research Section विस्तारीत क्रमांक - १२३, १२४, १२५

Ref No. PAHSUS/ARD/Ph.D.-I/2019/ 8307 **Date:** 31 OCT 2019

To,
The Principal,
SVERI's College of Engineering, Pandharpur,
Tal-Pandharpur, Dist-Solapur-413304.

Subject :- Approval of M.E./M.Tech. Computer Sci. and Engineering Dissertation Title.
Reference :- RRC Meeting Dated 27/09/2019

Sir/Madam,

With reference to above Subject, I am directed to inform you that, Research & Recognition Committee has accorded approval to the title of **M.E./M.Tech. Computer Science and Engineering** Dissertation, as mentioned overleaf.

You are requested to bring the approval to the notice of concerned guide and students.

Thanking you.

Yours Faithfully,

(Assistant Registrar)
Research Development (Ph.D.-I)

Copy to :-
The Director,
Board of Examinations and Evaluation,
P.A.H., Solapur University, Solapur.

College of Engineering
Pandharpur.
Inward No...887.....
Date -.....04/11/2019.....

To, HOD CSE
Please inform it to
your students and
respective guide.

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P.A.H. SOLAPUR UNIVERSITY, SOLAPUR

Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Computer Science and Engineering** **RRC Date:27/09/2019**

Sr. No.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
1	**Mr. Krushna Bharat Pise** SVERI's College of Engineering, Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. S.M. Shinde** SVERI's College of Engg. Tal-Pandharpur, Dist-Solapur	Supply chain management system using blockchain technology	**Approved**
2	**Mr. Tushar Ramdas Bhosale** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. S.M. Shinde** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Performance evaluation of predictive and prescriptive analytics on big data	**Approved with Inclusion of Liteature reriew problem statement & proper methodology** **Suggestion: Problem statement has to be speaifed, Liteature review not in defail it should have papers refered & inference from them. System architecture has to be incluned methology is not properly given.**
3	**Ms. Vidya Balkrishna Maskar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	M.Tech. July, 2018	**Prof. V.D. Jadhav** SVERI's College of Engg., Tal-Pandharpur, Dist-Solapur	Clustering of fruits images based on color and shape using machine learning	**Approved**
4	**Mr. Shamsundar S. Bhimade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	M.Tech. July, 2018	**Prof. A.M. Dyade** SVERI's College of Engg., Tal-Pandharpur, Solapur	Data sharing with fine-grained access control using block chain technology	**Approved with inclusion of system architecture** **Suggestion : System architecture should be included in synopsis**
5	**Ms. Kanchan I Chouhan** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. V.D. Jadhav** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur-413304	Implementation of smart voting through UID verification by using face recognition	**Approved with change in title** **Suggestion title: Smart Voting through UID Verification using face Recognition**
6	**Mr. Naganath B. Khade** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. S.M. Shinde** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Effective networking intrusion detection system using machine learning	**Approved with suggestion for inclusion of system architecture** **Suggestion: Include system architecture / Block diagram in synopsis**
7	**Ms. Ashwini S. Palkar** SVERI's College of Engineering, Pandharpur, Dist-Solapur-413304	M.Tech. July, 18	**Prof. S.M. Shinde** SVERI's College of Engg. Tal-Pandharpur, Dist-Solapur	Multilevel trust in privacy preserving data market by achieving data truthfulness	**Approved**

P.T.O.

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Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Computer Science and Engineering** **RRC Date:27/09/2019**

Sr. No.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
8	**Mr. Sourab M. Sirdeshmukh** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. P.A. Satarkar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Sclapur	Agriculture soil analysis, classification and crop suitability recommendation using machine learning	**Approved**
9	**Ms. Snehal R. Korke** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. July, 2018	**Prof. A.M. Dyade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Detecting phishing websites using machine learning	**Approved with suggestion for inculsion of system architecture Suggestion: System architecture/ Block diagram should be included in synopsis**
10	**Ms. Akshata Sunil Jadhav** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. P.A. Satarkar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Performance improvement in Li-Fi based network	**Approved**
11	**Ms. Dhanashri V. Galande** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. A.M. Dyade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Healthcare management system using blockchain technology	**Approved with suggestion for inculsion of system architecture Suggestion: Inclusion of System architecture in Synopsis**
12	**Ms. Namrata B. Dhavare** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2018	**Prof. P.A. Satarkar** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Problem solving using VLC through Li-Fi networking	**Approved with suggestion for inculsion of system architecture Suggestion: Inclusion of Block diagram or System architecture in Synopsis**
13	**Ms. Sonali Satish Kachare** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech. August, 2015	**Prof. A.M. Dyade** SVERI's College of Engineering, Tal-Pandharpur, Dist-Solapur	Proposed hybrid RSA algorithm for cloud computing	**Approved with suggestion for inculsion of block diagram or system architecture in synopsis**
14	**Mr. Daiwan R. Karade** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Prof. V. D. Jadhav** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Design of an Expert System for farmers by using data analysis and data mining concepts	**Approved with change in Title Suggested title : An Expert System for Grop Predichan Using Machine Learning**

ASST. REGISTRAR
ARD SECTION
Solapur University, Solapur.

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28/08/19

The following staff member were present for synopsis presentation of our M.Tech students @ 11.30 am on wednesday, 28/08/2019 at Dept. seminar Hall.

Name of faculty members:

1) Dr. N. D. Kamande
2. Prof. P. A. Sabarkar

① Name of the student: Krushna Bharat pise

Project title : supply chain management system using Blockchain Technology.

Signature :

② Name of the student:- Mr. Sham sadashiv Bhimade
Project Title :- Data sharing with fine-grained Access control using block chain Technology

Signature :

③ Name of the Student :- Mr. Tushar Ramdas Bhosale
Project Title : Performance Evaluation of Predictive and Prescriptive Analytics on Big Data

Signature :

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(4) Name of student:- Mr. Nagamath Bwasaheb Khade
Project Tittle:- Effective Networking Intrusion Detection system using machine learning.
signature:- Khade

(5) Name of student: Mr. Saurabh Manohar Sindeshmukh
Project Title: Agriculture soil Analysis, Classification & crop suitability Recommendation Using Machine Learning.
signature: [signature]

(6) Name of student:- Ms. Jadhav Akshata Suni
Project title:- Performance Improvement in Li-fi based Network
sig:- Jadhav

(7) Name of student:- Ms. Vidya Balkrishna Maskar
project title:- Clustering of fruits image based on color and shape using machine Learning.
Sign - Maskar

(8) Name of student - Ms. chouhan kanchan Iccharam
project title - Smart voting through UID verification by using Face Recognition.
sign - [signature]

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8) Name of Student : Miss. Kaeshare Sonali Satish

Project Title : Proposed Hybrid RSA algorithm for Cloud computing

Sign : Sonali

9) Name of Student : Ms. Korke Snehal Rajendra

Project Title :- Detecting phishing Websites using machine learning.

Sign :- Korkes.R

10) Name of student :- Ms. Galande Dhanshri Vitthal

Project Title :- Healthcare management system using Blockchain technology

Sign : Galande.

11) Name of student : Nameeta Balizam Thavare

project Title : solving problems using VLC Through Li-Fi Networking.

sign : Nameeta

12) Name of student : Ashwini sudarshan pallsar

project Title : Multilevel trust in privacy preserving data market by Achieving data truthfullness

sign: Aspallw

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सोलापूर विद्यापीठ
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Sr. No.: 10/2017/A4 0799917



Statement of Grade for Faculty of Engineering & Technology-Master of Engineering (With Credit)-Regular-Choice Based Credit System-COMPUTER SCIENCE & ENGINEERING-M.E.-IISem-IV
Examination: Oct-2019

Name: **KACHARE SONALI SATISH (REKHA)**
PRN: **2015032500318636** Seat Number: **531863**
College: **College of Engineering, Gopalpur (COEP)**
Exam Center : **Pandharpur (02)**

Paper Code	Paper Name			Credits	Grade Obtained	Grade Points	Earned Gr Points	Remark
70792104	Lab Practice			1.00	O	10.00	10.00	E,C
70792105	Dissertation Phase-I(Synopsis Submission Seminar)			3.00	O	10.00	30.00	E,C
70792106	Dissertation Phase-II(Term Work)			3.00	O	10.00	30.00	E,C
70792107	Dissertation Phase-II(Progress Seminar Presentation)			6.00	O	10.00	60.00	E,C
70792103	Computer Network Administration(SL)			3.00	O	10.00	30.00	E,C
Sem-III	**Credit: 16.00**	**EGP: 160.00**	**SGPA: 10.00**	**Status: Pass**				
70792203	Final Presentation & Viva-Voce			6.00	O	10.00	60.00	E,C
70792202	Dissertation Phase-IV(Term Work)			6.00	O	10.00	60.00	E,C
70792201	Dissertation Phase-III(Progress Seminar presentation and Report)			4.00	O	10.00	40.00	E,C
Sem-IV	**Credit: 16.00**	**EGP: 160.00**	**SGPA: 10.00**	**Status: Pass**				
M.E.-II (Seat No: 531863 Exam Event: Oct-2019)								
	Total Credit: 32.00	**EGP: 320.00**	**SGPA: 10.00**	**Status: Pass**				
M.E.-I (Seat No: 714436 Exam Event: Mar-2016)								
	Total Credit: 44.00	**EGP: 404.00**	**SGPA: 9.18**	**Status: Pass**				
Cumulative	**Total Credits : 76.00**	**Total EGP : 724.00**	**SGPA : 9.53**	**CGPA : 9.53**		**Status : Pass**		
	Grand Total : 1939/2350	**Equivalent Percentage : 82.51 %**		**Grade : O**		**Ordinance : Not Applied**		

Abbreviations: Gr: Grade, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average, EGP: Earned Grade Points, E: Exempted, C: Current Appearance, X: Past Performance, N: Not Exempted, UM: Unfair Means, FC: Fail in University Assessment, FR: Fail in College Assessment

Punyashlok Ahilyadevi Holkar Solapur University ★ Board of Examinations and Evaluation

Statement No: 5963617
Date: 20 Jan 2021

Director
Board of Examinations and Evaluation

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Department of Computer Science and Engineering

List of Students Undertaking

Dissertation Phase-III: Progress Seminar
Dissertation Phase-IV
Final Submission of the Dissertation and Viva-Voce

Class: M. E -II

Academic Year-2019-20

Roll. No.	Name of Student
1	Ms. Shinde Varsha Rajesh
2	Mr. More Mandar Manik
3	Ms. Kachare Sonali Satish

P.G. Co-ordinator

HOD,
Department of Computer Science & Engg
SVERI's C.O.E. Pandharpur.

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Date: 13/8/19

The following staff members were present for internal project presentation of our ME student at 10.00 am in CSE department Seminar Hall on Tuesday, 13/08/2019.

Name of faculty Members -

1) Dr. Bhumkumari - (HOD)

2) Dr N. D. Karande - (P.G. Co-ordinator)

3) Mrs. V. D. Jadhav - (Guide)

Name of Student: Mr. Mandar Manik More

Title: Run Time Load Distribution Over LSR Protocol

Sign: Mandar

Date: 13/08/2019

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09/09/2019

The following staff members were present for ~~synopsis~~ internal project presentation (Final Pre submission of Dissertation Report) of our M.Tech student at 12.30 pm In class room 504, CSE department on Monday, 09/09/2019.

Name of Faculty members:

① Dr. N. D. Karande
PG. Coordinator

② Mrs. V. D. Jadhav

③ Mrs. P. A. Satarkar

Name of student : Shinde Varsha Rajesh
Title : Detection of Black hole attacks in AODV routing protocol in MANET

Sign : shinde V. R.
Date : 9/9/19

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following staff members were present for DP-III and DP-IV presentation of our M.E student on online (google meet) on. 23/08/2020

Name of faculty : sign.

1> Prof. A. M. Dyade

Name of student — Sonali Satish Kachare

Title of project — Proposed hybride RSA Algo. for cloud computing.

Date — 23/08/2020

sign

Date 04/01/2020

Following staff members were present for final presentation and viva-voce of our M.E. student at 12.00 p.m. in Computer Centre lab - CSE Dept on Saturday 04/01/2020

Sr.No.	Name of the faculty Members		Sign
1.	Prof. M. B. Bonare	A.I.T Pune	
2	Mr. V. R Kalshetty		
3	Mr. S. M. Shinde		
4.	Miss. K.I. Chouhan		
5	Ms. A-S. Jadhav		
6.	Ms. S.R. Korke		
7.	Ms. D.D. Chavare		

Name of student :- Ms. Shinde Varsha Rajesh
Title of project :- Detection of Black hole attacks in AODV routing protocol in MANET.

sign Shinde V.R
Date 4/01/2020

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Date 19/01/20

Following staff members were present for final presentation of and Viva-voce of our M.E. Student at 12:30 pm in ~~room~~ seminar Hall of CSE Dept. on Sunday 19/01/2020

Sr No.	Name of Faculty Members.	Sign
1	Prof. A.C. Adamuthe External RIT.	~~Adamuthe~~
2	Mr. V.M. Sale	~~Sale~~
3	Mrs V.D. Jadhav	
4.	MS. V.B. Maskar	Maskar
5.	Ms. A.S. Jadhav	~~Jadhav~~
6.	Miss. K.F. chouhan	chouhan

Name of student :- Mr. More Mandar Manik
Title of project :- Runtime load distribution over LSRP Protocol.

Sign. - Mandar
Date - 19/01/2020

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Following staff members were present for final presentation and viva-voce of our M.E student on online mode (google meet) at 6.00 pm on 13/12/20

Sr. No.	Name of faculty member	Sign
1)	Prof. A.M. Dyade	
2)	Prof S.D. Khatavkar	
3)	Mr. V.M. Sale.	

Name of student :- Ms. Sonali S. Kachare

Title of project :- Proposed hybrid RSA Algo. for cloud computing

Sign

Date - 13/12/20

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COLLEGE OF ENGINEERING, PANDHARPUR



CERTIFICATE

This is to certify that the Dissertation report entitled **"Run Time Load Distribution Over LSRP Protocol"** has been completed successfully and submitted by **Mr. Mandar More** of M.E. (COMPUTER SCIENCE & ENGINEERING) class in the partial fulfillment for the award of Master's degree in COMPUTER SCIENCE & ENGINEERING as per curriculum laid by the PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR during the Academic Year 2018-2019.

(Prof. Jadhav V.D.)
GUIDE

(Dr. Mrs. Bhuwaneshwari Melinamath)
HOD CSE

(Dr. RONGE B.P.)
PRINCIPAL

(EXTERNAL EXAMINER)

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SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

CERTIFICATE

This is to certify that the dissertation entitled

"Proposed hybrid RSA algorithm for cloud computing"

Has been submitted by

Miss. Sonali Satish Kachare

is hereby scrutinized and approved by ***Computer Science and Engineering Departmental*** *PG dissertation approval committee and forwarded to Punyashlok Ahilyadevi Holkar Solapur University authorities for approval of PG disseratation during the academic year 2019-20.*

(Prof. A. M. Dyade)		
Guide	Examiner-I	Examiner-II

(Panel of PG Dissertation Report Approval Committee)

(Prof. V. M. Sale)	**(Dr. B. C. Melinamath)**	**(Dr. B. P. Ronge)**
P. G. Co-ordinator	Head, CSE. Dept.	Principal

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Website : su.digitaluniversity.ac

सोलापूर विद्यापीठ
॥ विद्यया संपन्नता ॥

Sr. No.: 10/2018/A4 1575781



Statement of Grade for Faculty of Engineering & Technology-Master of Engineering (With Credit)-Regular-Choice Based Credit System-COMPUTER SCIENCE & ENGINEERING-M.E.-IISem-IV
Examination: Mar-2019

Name: **MORE MANDAR MANIK (MANGAL)**
PRN: **2015032500318725** Seat Number: **503187**
College: **College of Engineering, Gopalpur (COEP)**
Exam Center : **Pandharpur (02)**

Paper Code	Paper Name	Credits	Grade Obtained	Grade Points	Earned Gr Points	Remark
70792104	Lab Practice	1.00	O	10.00	10.00	E,X
70792105	Dissertation Phase-I(Synopsis Submission Seminar)	3.00	O	10.00	30.00	E,X
70792106	Dissertation Phase-II(Term Work)	3.00	O	10.00	30.00	E,X
70792107	Dissertation Phase-II(Progress Seminar Presentation)	6.00	O	10.00	60.00	E,X
70792103	Computer Network Administration(SL)	3.00	A	8.00	24.00	E,X
Sem-III	**Credit: 16.00 EGP: 154.00 SGPA: 9.63**	**Status: Pass**				
70792203	Final Presentation & Viva-Voce	6.00	O	10.00	60.00	E,C
70792202	Dissertation Phase-IV(Term Work)	6.00	O	10.00	60.00	E,C
70792201	Dissertation Phase-III(Progress Seminar presentation and Report)	4.00	O	10.00	40.00	E,C
Sem-IV	**Credit: 16.00 EGP: 160.00 SGPA: 10.00**	**Status: Pass**				
M.E.-II (Seat No: 503187 Exam Event: Mar-2019)						
	Total Credit: 32.00 EGP: 314.00 SGPA: 9.81	**Statu : Pass**				
M.E.-I (Seat No: 761201 Exam Event: Oct-2017)						
	Total Credit: 44.00 EGP: 360.00 SGPA: 8.18	**Status: Pass**				
Cumulative	**Total Credits : 76.00 Total EGP : 674.00 SGPA : 8.87 CGPA : 8.87 Status : Pass**					
	Grand Total : 1705/2350 Equivalent Percentage : 72.55 % Grade : A+ Ordinance : Not Applied					

Abbreviations: Gr: Grade, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average, EGP: Earned Grade Points, E: Exempted, C: Current Appearance, X: Past Performance, N: Not Exempted, UM: Unfair Means, FC: Fail in University Assessment, FR: Fail in College Assessment

Punyashlok Ahilyadevi Holkar Solapur University ★ Board of Examinations And Evaluation

Statement No: 5258465
Date: 27 Jan 2020

Director
Board of Examinations and Evaluation

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Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304 District. Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: M.Tech. Electronics & Tele-communication Engineering **Programme Code:** 1-1408968335			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Dissertation Phase I : Synopsis Submission Seminar		09
2.	Dissertation Phase II : ICA		
3.	Dissertation Phase II : Progress Seminar		
4.	Dissertation Phase III : Progress Seminar		
5.	Dissertation Phase IV : Final presentation and submission of report		
6.	Final Submission of the Dissertation and Viva-voce		

COLLEGE OF ENGINEERING PANDHARPUR

B. Ranga
PRINCIPAL,
College of Engineering
PANDHARPUR

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SHRI VITHAL EDUCATION & RESEARCH INSTITUTE'S
COLLEGE OF ENGINEERING, PANDHARPUR
P.B. No. 54, Gopalpur -Ranjani Road, Gopalpur, Tal.- Pandharpur- 413 304,Dist.- Solapur (Maharashtra)
Tel.: 02186-216063, 9503103757, E-mail : coe@sveri.ac.in, Website: www.sveri.ac.in
(Approved by A.I.C.T.E., New Delhi and affiliated to Solapur University, Solapur)
NBA Accredited all Eligible UG Programmes and , NAAC, Accredited Institute,
Accredited by the Institute of Engineers (India), Kolkata and TCS, Pune ISO 9001-2015 Certified Institute
Department of Electronics and Telecommunication Engineering

Class: M.Tech- II **Academic Year-2019-20**

List of Students Undertaking

Dissertation Phase-I: Synopsis Submission Seminar
Dissertation Phase-II: ICA
Dissertation Phase-II: Progress Seminar
Dissertation Phase-III: Progress Seminar
Dissertation Phase IV
Final Submission of the Dissertation and Viva –Voce

Roll.No	Name of Student
1.	Ms. Dipali Vasant Atkale
2.	Ms. Shabdali Charudatta Deshpande
3.	Ms. Marab Sheetal shivraj
4.	Ms. Reshma Rajendra Deshmukh
5.	Ms. Snehal Rajendra Surwase
6.	Mr. Valate Pandurang Sadashiv

(Prof. M. M. Pawar)
PG Coordinator

(Dr. A. S. Vibhute)
Head, ENTC Engg. Dept.

HEAD
Dept. of Electronics & Telecom. Engg.
S.V.C.E. Pandharpur

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर

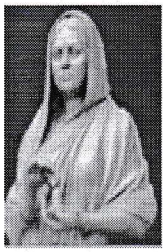
Punyashlok Ahilyadevi Holkar Solapur University, Solapur

केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)

दुरध्वनी : ०२१७-२७४४७७१/७२/७३/ (११ लाईन्स), फॅक्स : ०२१७-२३५१३०

संकेतस्थळ: http://su.digitaluniversity.ac/www.sus.ac.in ई-मेल: bcudpgbutr@sus.ac.in

NAAC Accredited-2015
'B' Grade (CGPA 2.62)



Ph.D Research Section | **विस्तारीत क्रमांक - १२३ , १२४, १२५**

Ref No. PAHSUS/ARD/Ph.D.-I/2020/ 1314 **Date:** 5 FEB 2020

To,
The Principal,
SVERI's College of Engineering, Pandharpur,
Tal-Pandharpur, Dist-Solapur-413304.

Subject :- Approval of M.E./M.Tech. Dissertation Title.

Reference :- RRC Meeting Dated 28/01/2020.

Sir/Madam,

With reference to above Subject, I am directed to inform you that, Research & Recognition Committee has accorded approval to the title of **M.E./M.Tech. Electronics and Telecommunication Engineering** Dissertation, as mentioned overleaf.

You are requested to bring the approval to the notice of concerned guide and students.

Thanking you.

Yours Faithfully,

(Assistant Registrar)
Research Development (Ph.D.-I)

Copy to :-
The Director,
Board of Examinations and Evaluation,
P.A.H., Solapur University, Solapur.

To, Registrar/ HOD Electronics/ Co-ordinator

College of Engineering
Pandharpur.
Inward No...1293.....
Date ..11/02/2020

P.A.H. SOLAPUR UNIVERSITY, SOLAPUR

Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Electronics & Teleco. Engg Date: 28/01/2020**

r. o.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
	Miss. Anuja A. Unune SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2017	**Mr. A. S. Vibhute** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Fruit Weight Estimation Using Image Processing and Neural Network	**Problem Statement need to be defined Properly**
	Miss. Mayuri A. Dongare SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2017	**Prof. Ms. J. A. Kendule** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Single Image Haze Removal Using Convolution Neural Network	**Approved with Corrected Title "Image Haze Removal Using Convolution Neural Network"**
	Miss. Reshma R. Deshmukh SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Mr. A. S. Vibhute** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Attribute Inspection of Product Using Image Processing	**Approved**
	Miss. Shraddha. B. Kshirsagar SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Mr. A. S. Vibhute** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Blood Count Analysis Using Machine Learning Approach	**Approved**
	Miss. Shital S. Yadav SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Mr. A. S. Vibhute** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Emotion Detection Using Deep Learning Algorthm	**Title Approved Problem Statement and Objective need to be defined Properly**
	Miss.Dipali V. Atkale SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Dr. Mrs. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Image Generation Network for Face Aging Using Deep learning	**Approved**
	Miss. Shabdali C. Deshpande SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Dr. Mrs. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Design of adversarial neural Networks to generate realistic colored images from the given gray scale images.	**Approved**

Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Electronics & Teleco. Engg Date:28/01/2020**

r. o.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
8	**Miss. Sheetal S. Marab** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Dr. Mrs. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Deep learning based single image super resolution	**Approved**
9	**Miss. Dhanashree M. Yadav** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Prof. M. S. Mathpati** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Design and Analysis of a Fractal Antenna for 5G Applications	**Title Approved** **Scope of the Research work is not properly defined should resubmit the synopsys by defining proper scope of work**
10	**Miss. Trupti D. Pujari** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Prof. Mrs. J. A. Kendule** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Collision Avoidance Using V2V Communication	**Not Approved** **Should Resubmit**
11	**Miss. Pranali K. Kolekar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Prof. Mrs. J. A. Kendule** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Brain Tumor segmentation Using Convolution Neural Network	**Approved**
12	**Miss. Pradnya B. Maske** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	ME Aug. 2017	**Prof. Ms. J. a. Kendule** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Image Retrievalusing end to end Convolution Neural Network	**Approved**
13	**Miss. Snehal R. Surwase** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M.Tech Aug. 2018	**Dr. Ms. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Vehicle logo Recognition Using Dee Learning	**Approved**

29/01/2020

(Assistant Registrar)
Research Department (Ph.D.-I)

Online.

(75)

PAGE :
DATE : / /

M. Tech. final submission of Dissertation Vivavoce

Date: 02/10/2020 Time: 2:30 pm.

Name of student: Ms. Dipali Vasant Atkale

Year of Registration: Aug 2018

Title of Dissertation: Image Generation network for face aging using Deep learning.

Examiners:

Internal Examiner: Dr. Meenakshi M. Pawar

sign : Pawar.

External Examiner: Dr. satish kumar chavan.

sign : (Online)

Name of college : Don Bosco Institute of Technology Kurla West Mumbai 400070.

Contact : 7738104543

Venue: PG lab, 426, SVERI's COE P'pur.

The following members were present (online)

1. Dr. M.M. Pawar - Pawar.

online

PAGE
DATE : / /

M. Tech final Submission of Dissertation Viva Voce

Date : 02/10/2020 Time : 3:30 pm

Name of student : Ms. Shabdali charudatta Deshpande

Year of Registration: Aug 2018.

Title of Dissertation: Design of adversarial neural networks to generate realistic colored images from the given grayscale images.

Examiners:

Internal Examiner : Dr. Meenakshi M. Pawar

sign :

External Examiner: Dr. Satishkumar Chavan.

sign : (Online)

Name of college : Don Bosco Institute of Technology Kurla West Mumbai 400070.

Contact : 7738104543.

Venue : PG lab : MF 426, SVER's COE, Pipur.

The following members were present (Online)

1. Dr. M.M. Pawar -
2. Suvarna Dadaso Pyfale -

#7

Online.

PAGE :
DATE : / /

M. Tech final submission of Dissertation & Viva voce (ESD)

Date: 03/10/2020 Time: 2:30 pm

Name of student: Ms. sheetal shivraj Marab

Year of registration: Aug 2018

Title of Dissertation: A novel edge boosting approach for image super resolution.

Examiners:

Internal examiner: Dr. Meenakshi M. Pawar

sign:

External examiner: Dr. Satishkumar chavan

sign: (Online)

Name of college: Don Bosco Institute of Technology Kurla West Mumbai 400070.

Contact: 7738104543

Venue: PG lab: MF 426, SVERI's COE, Pandharpur

The following member were present (online)

1. Dr. M.M. Pawar

Online.

PAGE :
DATE : / /

(16)

MTech final Submission of Dissertation & Viva Voce.

Date: 08/10/2020 Time: 10:30 AM.

Name of student : Ms. Reshma Rajendra Deshmukh

Year of Registration : Aug 2018

Title of Dissertation : Attribute Inspection of product Using Image Processing.

Examiners:

Internal Examiner : Dr. Anup S. Vibhute.

Sign :

External Examiner : Dr. S. D. Raikar

College : WCE, Sangli

Contact : 9422542119

Venue : PG lab : MF 426, SVERI COEP

The following members were present (online)

1. Dr. A. S. Vibhute
2. Dr M. M. Pawar.

(79)

Online

PAGE :
DATE : / /

CESE

M. Tech final submission of Dissertation & viva voce

Date : 08/10/2020 Time : 11 : 15 AM

Name of student : Ms sneha Rajendra Surwase

Title of Dissertation : Vehicle Logo Recognition using Deep Learning.

Year of Registration : Aug 2018

Examiners :

Internal Examiner : Dr. M. M. Pawar

Sign :

External Examiner : Dr. S. D. Raikar

College : WCE, Sangli

Contact NO. : 9422542119

Venue : PG lab, MF 426 SVERI COEP

The following members were present (online)

1. Dr. A. S. Vibhute
2. Dr. M. M. Pawar -

(81)

Online

PAGE :
DATE : / /

ME final Submission of dissertation + Vivavoce

Date :→ 10/01/2021 Time :- 10:00 AM

Name of Student :- Ms. Pradnya Baliram Maske

Title of dissertation :- Image ~~pr~~ Retrieval using end to end convolution Neural Network

Year of Registration :- Aug 2017

Examiners :-

Internal Examiner : Ms. J.A. Kendule.

Sign :

External Examiner : Dr. Shubhagi Patil

College : J.J.M. Jaysingpur

Contact No: 9422618670.

Venue : PG lab, MF426, SVERI COE

The following members were present (online)

1. Ms J.A Kendule
2. Dr. M.M. Pawar

online

(82)

PAGE
DATE / /

ech final submission of dissertation & Viva Voce

e:- 15/01/2021 Time :- 2:00 PM.

e of student :- Ms. Pranali kumar kolekar.

e of dissertation :- Brain Tumor segmentation using convolution Neural Network

ar of Registration :- Aug 2018

xaminers :-

Internal Examiner :- Ms. J. A. Kendule

Sign :-

External Examiner :- Dr. Supriya Rajankar.

college :- sinhgad campus vadgaon.

contact No :- 9423614600

Venue :- PG lab, MF 426, SVERI COE.

The following members are present (online) :-

1. Ms. J. A. Kendule.
2. Dr. M. M. Pawar

online

PAGE :
DATE : / /

MTech final submission of dissertation & Vivavoce

Date : 21/01/2021 Time : 11:30 AM

Name of student : Kshirsagar shraddha Babasaheb

Title of dissertation : Blood count analysis using machine learning approach.

Year of Registration : Aug. 2018

Examiners :

Internal examiner : Dr. A. S. Nibhute

sign :

External Examiner : Dr. Mrs. M R Bachute

college : Symbiosis Institute of Tech, Pune.

contact no : 9767107191

Venue : PG lab, MF426, SVERI's COE

The following members are present (online) :

1. Dr. M. M. Pawar (PG co-ordinator)
2. J. S. Shinde

online

PAGE
DATE / /

M.Tech final submission of dissertation & viva voce

Date : 29/01/2021 Time : 10.00 AM

Name of student : / Dhanashree Madhukar Yadav

Title of dissertation : Design and Analysis of a fractal Antenna for 5G Applications.

Year of Registration : Aug. 2018

Examiners :

-Internal Examiner : Prof. M.S. Mathpati

Sign :

External Examiner : Dr. B. Suryakant
College : Bheemanna Khandre Institute of Technology, Bhalki, Bidar, Karnataka.
Contact No : 9620055885

Venue : PG Lab, MF 426, SVERI COEP.

The following members are present (online) :-

1. Dr. M.M. Pawar (PG Coordinator)
2. Prof. M.S. Mathpati (Guide)

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304, Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)

Year -2019-20

CERTIFICATE

This is to certify that the thesis entitled

"IMAGE GENERATION NETWORK FOR FACE AGING USING DEEP LEARNING"

submitted by

MISS. DIPALI VASANT ATKALE

For partial fulfillment of Masters of technology Dissertation in Electronics and Telecommunication as per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020.

Dr. Mrs. M. M. Pawar	**Dr. A. S. Vibhute**	**Dr. B. P. Ronge**
(Guide, ENTC)	(HOD, ENTC)	(Principal)

Date: **(Prof.)**

Time: **External Examiner**

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)

Year -2019-20

CERTIFICATE

This is to certify that the thesis entitled

"DSIGN OF ADVERSERIAL NETWORK NETWORKS TO GENERATE REALISTIC COLORED IMAGES GIVEN GRAY SCALED IMAGES."

submitted by

MISS. SHABDALI CHARUDATTA DESHPANDE.

For partial fulfillment of Masters of technology Dissertation in Electronics and Telecommunication as per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020.

Dr. Mrs. M. M. Pawar	**Dr. A. S. Vibhute**	**Dr. B. P. Ronge**
(Guide, ENTC)	(HOD, ENTC)	(Principal)

Date: **(Prof.)**

Time: **External Examiner**

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)

Year -2019-20

CERTIFICATE

This is to certify that the thesis entitled

"A NOVEL EDGE BOOSTING APPROACH FOR IMAGE SUPER RESOLUTION."

submitted by

MISS. SHEETAL SHIVRAJ MARAB.

For partial fulfillment of Masters of technology Dissertation in Electronics and Telecommunication as per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020.

Dr. Mrs. M. M. Pawar	**Dr. A. S. Vibhute**	**Dr. B. P. Ronge**
(Guide, ENTC)	(HOD, ENTC)	(Principal)

Date: **(Prof.)**

Time: **External Examiner**

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)

Year -2019-20

CERTIFICATE

This is to certify that the thesis entitled

"ATTRIBUTE INSPECTION OF PRODUCT USING IMAGE PROCESSING"

submitted by

MISS. RESHMARAJENDRA DESHMUKH

For partial fulfillment of Masters of Technology Dissertation in Electronics and Telecommunication as per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020.

Dr. A. S. Vibhute	**Dr. A. S. Vibhute**	**Dr. B. P. Ronge**
(Guide, ENTC)	(HOD, ENTC)	(Principal)

Date: **(Prof.)**

Time: **External Examiner**

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)
Year -2019-20

Certificate

This is to certify that the project report entitled

"VEHICLE LOGO RECOGNITION USING DEEP LEARNING"

submitted by

Miss. Snehal Rajendra Surwase

for partial fulfillment of BE in Electronics and Telecommunications per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020

(Dr.M.M.Pawar)	(Dr. A. S. Vibhute)	(Dr. B. P. Ronge)
GUIDE	**H.O.D.**	**PRINCIPLE**

Date: _____ Prof. _____

Place: Pandharpur. EXTERNAL EXAMINER

SVERI's

COLLEGE OF ENGINEERING, PANDHARPUR

Department of Electronics and Telecommunication Engineering

CERTIFICATE

This is to certify that the Dissertation entitled **"Image Retreival using End-to-End Convolution Neural Network"** has been completed successfully and submitted by **Ms. Maske Pradnya Baliram** of **M.E. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)** class in the partial fulfillment for the award of Master's Degree in **ELECTRONICS & TELECOMMUNICATION ENGINEERING** as per Curriculum laid by PAH SOLAPUR UNIVERSITY, SOLAPUR during the Academic Year 2019-20.

(Ms. J. A. Kendule)
GUIDE

(Dr. A. S. Vibhute)
H.O.D ENTC

(Dr. B. P. Ronge)
PRINCIPAL

EXTERNAL EXAMINER

SVERI's

COLLEGE OF ENGINEERING, PANDHARPUR

Department of Electronics and Telecommunication Engineering

CERTIFICATE

This is to certify that the Dissertation entitled **"Brain Tumor Segmentation Using Convolution Neural Network"** has been completed successfully and submitted by **Ms. Kolekar Pranali Kumar** of **M.Tech. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)** class in the partial fulfillment for the award of Master's Degree in **ELECTRONICS & TELECOMMUNICATION ENGINEERING** as per Curriculum laid by PAH SOLAPUR UNIVERSITY, SOLAPUR during the Academic Year 2019-20.

(Ms. J. A. Kendule)
GUIDE

(Dr. A. S. Vibhute)
H.O.D ENTC

(Dr. B. P. Ronge)
PRINCIPAL

EXTERNAL EXAMINER

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)

Year -2019-20

CERTIFICATE

This is to certify that the thesis entitled

"BLOOD COUNT ANALYSIS USING MACHINE LEARNING APPROACH"

submitted by

MISS. SHRADDHA BABASAHEB KSHIRSAGAR

For partial fulfillment of Masters of technology Dissertation in Electronics and Telecommunication as per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020.

Dr. A. S. Vibhute	**Dr. A. S. Vibhute**	**Dr. B. P. Ronge**
(Guide, ENTC)	(HOD, ENTC)	(Principal)

Date: **(Prof.)**

Time: **External Examiner**

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR.

Gopalpur-Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)

Year -2019-20

CERTIFICATE

This is to certify that the thesis entitled "**DESIGN AND ANALYSIS OF FRACTAL ANTENNA FOR 5G APPLICATIONS**" has been completed successfully and submitted by **Miss. Dhanashree Madhukar Yadav** for partial fulfillment of Masters of technology Dissertation in Electronics and Telecommunication as per requirement of Punyashlok Ahilyadevi Holkar Solapur University, Solapur for the academic year 2019-2020.

Mr. M. S. Mathpati	**Dr. A. S. Vibhute**	**Dr. B. P. Ronge**
(Guide, ENTC)	(HOD, ENTC)	(Principal)

Date: **(Prof.)**

Time: **External Examiner**

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- Date:-

1.3.3 Number of the student studied course on experimental learning through Project Work / Internship

Programme Name: M.Tech. Civil -Structural Engineering Programme Code: 1-1408968343			
Year of offering: 2019-2020			
Sr. No.	**Name of the Course that include experiential learning through project work/field work/internship**	**Course code**	**Number of the student studied course on experiential learning through project work/field work/internship**
1.	Mini project		18
2.	Dissertation Phase I : Synopsis Submission Seminar		13
3.	Dissertation Phase II : ICA		
4.	Dissertation Phase II : Progress Seminar		
5.	Dissertation Phase III : Progress Seminar		
6.	Dissertation Phase IV : Final presentation and submission of report		
7.	Dissertation and Viva-voce		

PRINCIPAL,
College of Engineering
PANDHARPUR

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O/C

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P.B.No.54, Gopalpur - Ranjani Road, Gopalpur, Pandharpur - 413304, **District**: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, **Toll Free No.**: 1800-3000-4131 **e-mail.**: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, **NAAC** Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR/2019-20/563 Date:- 28/08/2019

To
Hon. Pro-Vice Chancellor,
Punyashlok Ahilyadevi Holkar Solapur University,
Dnyanteerth Nagar, Kegaon,
Solapur-Pune National Highway, Solapur- 413255.

Sub.:- Regarding submission of Synopsis of M.Tech. Dissertation of M.Tech. Civil (Structures) students.

Respected Sir,

We are submitting herewith Synopsis of our 09 M. Tech. Civil (Structures) students as per the details given in Annexure-I, attached herewith.

You are requested to kindly take up the Synopsis for further consideration and approval of the same.

Thanking you,

Yours faithfully,

B.P.Ronge

(Dr. B. P. Ronge)
PRINCIPAL

Encl:

1. List of students along with Titles of Synopsis of M.Tech Dissertation.
2. Six copies of Synopsis of each student.

Received
29/08/19
लिपीक
आवक - जावक विभाग
शैक्षणिक, संशोधन व विस्तार
सोलापूर विद्यापीठ, सोलापूर.

COLLEGE OF ENGINEERING PANDHARPUR

SVERI's College of Engineering, Pandharpur
Department of Civil Engineering.

Annexure-I

M. Tech. Civil (Structures)

Year 2019-20

Sr. No.	Name of Candidate	Title of Synopsis	Year of Registration	Name of Guide
1	Abhangrao Chaitali Rajendra	"Analysis of Cement Performance Using Microscopic Analysis Techniques"	2018	Dr. Prashant M. Pawar
2	Bagal Srushti Chandrakant	"Performance Based Seismic Design Analysis of Steel Frames."	2018	Dr. Prashant M. Pawar
3	Deshmane Shweta Anil	"Evaluation of Steel Fiber Reinforced Alkali Activated Slag Concrete along with Fly Ash."	2018	Dr. Ms. V. S. Kshirsagar
4	Ingale Sujata Janardhan	"Ultrasonic Pulse Velocity Performance Analysis of Concrete Under Various Conditions."	2018	Dr. Prashant M. Pawar
5	Jadhav Surekha Mahadev	"Numerical Analysis of Hollow Circular Monopile Structure."	2018	Dr. Prashant M. Pawar
6	Lachyan Pooja Shivanand	"Evaluation of Lateral Stability of Cantilever Rataining Wall."	2018	Prof. S. A. Gosavi
7	Mahamuni Nishigandha Vaijinath	"Design and Analysis of Slabs with Insertion Voids for Weight Minimization."	2018	Dr. Prashant M. Pawar
8	Patil Swapnil Mohan	"Analytical evaluation of seismic response reduction factor for steel frame building by using various types of steel	2018	Dr. Prashant M. Pawar
9	Pawar Prasad Shivaji	"Comparative Evaluation of Strength Properties of Green Concrete and Conventional Concrete."	2018	Prof. M. M. Pawar

COLLEGE OF ENGINEERING PANDHARPUR

B.Ronge

(Dr. B. P. Ronge)
PRINCIPAL

SOLAPUR UNIVERSITY

Punyashlok Ahilyadevi Holkar
Solapur University Solapur

Receipt (F.Y. : 2019 - 2020)

Number	: 9563	Dated	: 29-Aug-2019
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Remarks : M.tech Synopsys



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Clerk

Any discrepancy in the above receipt may kindly be brought to the notice of Cashier within two days.

SHRI VITHAL EDUCATION & RESEARCH INSTITUBE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Acad Year:2019-20 **ME (2nd Year) PROJECTS**

Sr. No.	NAME OF STUDENT	Project Title	NAME OF GUIDE
1	Abhangrao Chaitali Rajendra	"Analysis of Cement Performance Using Microscopic Analysis Techniques"	Dr. Prashant M. Pawar
2	Bagal Srushti Chandrakant	"Performance Based Seismic Design Analysis of Steel Frames."	Dr. Prashant M. Pawar
3	Deshmane Shweta Anil	"Evaluation of Steel Fiber Reinforced Alkali Activated Slag Concrete along with Fly Ash."	Dr. Ms. V. S. Kshirsagar
4	Ingale Sujata Janardhan	"Ultrasonic Pulse Velocity Performance Analysis of Concrete Under Various Conditions."	Dr. Prashant M. Pawar
5	Jadhav Surekha Mahadev	"Numerical Analysis of Hollow Circular Monopile Structure."	Dr. Prashant M. Pawar
6	Lachyan Pooja Shivanand	"Evaluation of Lateral Stability of Cantilever Rataining Wall."	Prof. S. A. Gosavi
7	Mahamuni Nishigandha Vaijinath	"Design and Analysis of Slabs with Insertion Voids for Weight Minimization."	Dr. Prashant M. Pawar
8	Patil Swapnil Mohan	"Analytical evaluation of seismic response reduction factor for steel frame building by using various types of steel bracing"	Dr. Prashant M. Pawar
9	Pawar Prasad Shivaji	"Comparative Evaluation of Strength Properties of Green Concrete and Conventional Concrete."	Prof. M. M. Pawar
10	Mr. Yogesh Gururaj Mane	"Experimental Study On Flexure And Compressive Strength Of The Reinforced Concrete Using Crushed Sand and Steel Fiber."	Prof. S. A. Gosavi
11	MR.SHUBHAM RAJABHAU GADE	"Structural Behaviour Of Voided Beam"	Prof. M .M. Pawar
12	MR. DANDGE PRATAP DHANANJAY	"To Study Performance of Rcc Multistoreyed Building During Progressive Collapse Using Staad-Pro"	Prof. S. A. Gosavi

(S.A. GOSAVI)
Project Co-ordinator

(Dr. P.M. Pawar)
H.O.D. Civil Dept.

SHRI VITHAL EDUCATION & RESEARCH INSTITUBE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Dessertation Phase-I: Synopsis Submission Seminar

Acad Year:2019-20 **Sem-III** **Class-ME (2nd Year)**

Sr. No.	Seat No	Name of Student	Disertation Phase I: Synopsis Submission Seminar
1	825139	BAGAL SRUSHTI CHANDRAKANT	48
2	825140	JADHAV SUREKHA MAHADEV	48
3	825141	INGALE SUJATA JANARDHAN	48
4	825144	ABHANGRAO CHAITALI RAJENDRA	48
5	825146	MANE YOGESH GURURAJ	44
6	825147	LACHYAN POOJA SHIVANAND	48
7	825148	MAHAMUNI NISHIGANDHA VAIJINATH	48
8	825151	SHAHABADE VIKRANT BABURAO	42
9	825152	PATIL SWAPNIL MOHAN	48
10	825153	PAWAR PRASAD SHIVAJI	44
11	825155	GADE SHUBHAM RAJABHAU	45
12	825157	DESHMANE SHWETA ANIL	47
13	825158	AIWALE HARI DHARMA	40

(Dr. P.M. Pawar)
H.O.D. Civil Dept.

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

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पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)

दुरध्वनी : ०२१७-२७४४७७१/७२/७३/ (११ लाईन्स), फॅक्स : ०२१७-२३५१३०

संकेतस्थळ: http://su.digitaluniversity.ac/www.sus.ac.in ई-मेल: bcudpgbutr@sus.ac.in

NAAC Accredited-2015
'B' Grade (CGPA 2.62)



Ph.D Research Section विस्तारीत क्रमांक - १२३, १२४, १२५

Ref No. PAHSUS/ARD/Ph.D.-I/2020/ 679 **Date:** 20 JAN 2020

To,
The Principal,
SVERI's College of Engineering, Pandharpur,
Tal-Pandharpur, Dist-Solapur-413304.

Subject :- Approval of M.E./M.Tech. Civil Engineering Dissertation Title.

Reference :- RRC Meeting Dated 13/01/2020.

Sir/Madam,

With reference to above Subject, I am directed to inform you that, Research & Recognition Committee has accorded approval to the title of **M.E./M.Tech. Civil Engineering** Dissertation, as mentioned overleaf.

You are requested to bring the approval to the notice of concerned guide and students.

Thanking you.

Yours Faithfully,

(Assistant Registrar)
Research Development (Ph.D.-I)

Copy to :-
The Director,
Board of Examinations and Evaluation,
P.A.H., Solapur University, Solapur.

College of Engineering
Pandharpur.
Inward No. 1234
Date - 23/01/2020

To, HOD Civil Engg.

P.A.H. SOLAPUR UNIVERSITY, SOLAPUR

Statement showing who have applied for M.E./M.Tech. Dissertation in subject of : **Civil Engineering** **RRC Date: 13/01/2020**

Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
Miss. Chaitali R. Abhangrao SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Analysis of Cement Performance Using Microscopic Analysis Techniques	**Approved**
Miss. Srushti C. Bagal SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Performance Based Seismic Design Analysis of Steel Frames	**Approved**
Miss. Shweta A. Deshmane SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	Dr. Ms. V. S. Kshirsagar SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Evaluation of Steel Fiber Reinforced Alkali activated Slag Concrete along with Fly Ash.	**Approved**
Miss. Sujata J. Ingale SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Ultrasonic Pulse Velocity Performance Analysis of Concrete Under Various Conditions	**Approved**
Miss. Surekha M. Jadhav SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Numerical Analysis of Hollow Circular Monopile Structure.	**Approved**
Miss. Pooja S. Lachyan SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Prof. S. A. Gosavi** SVERI's College of Engineering, Pandharpur,Tal-Pandharpur, Dist-Solapur-413304	Evaluation of Lateral Stability of Cantilever Walls	**Approved with title corrections**

Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
Miss. Nishigandha V. Mahamuni SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Design and Analysis of Slabs With Insertion Voids for Weight Minimization	**Approved**
Mr. Swapnil M. Patil SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Evaluation of seismic response reduction factor for steel frame building using various types of steel bracings	**Approved with title corrections**
Mr. Prasad S. Pawar SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Prof. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Comparative Study of Strength Properties of Green Concrete and Conventional Concrete.	**Approved with title corrections**
Mr. Yogesh Gururaj Mane SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Prof. S. A. Gosavi** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Experimental Study on Flexure and Compressive Strength of The Reinforced Concrete Using Crushed Sand and Steel Fiber	**Approved**
Mr. Shubham R. Gade SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	M. Tech 2018	**Prof. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Tal-Pandharpur, Dist-Solapur-413304	Structural Behaviour of Voided Beam	**Approved**
Mr. Dandge Pratap Dhananjay SVERI's College of Engneering, Tal- Pandharpur, Dist-Solapur	Aug 2015	**Prof. S.A. Gosavi** SVERI's College of Engneering, Tal- Pandharpur, Dist-Solapur	Study of Performance of RCC Multistoreyed Building During Progessive Collapse	**Approved with title corrections**

(Assistant Registrar)
Research Department (Ph.D.-I)

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)

दुरध्वनी : ०२१७-२७४४७७१/७२/७३/ (११ लाईन्स), फॅक्स : ०२१७-२३५१३०

संकेतस्थळ: http://su.digitaluniversity.ac/www.sus.ac.in ई-मेल: phd@sus.ac.in

NAAC Accredited-2015
'B' Grade (CGPA 2.62)



Ph.D Research Section विस्तारीत क्रमांक - १२३ , १२४, १२५

Ref No. PAHSUS/ARD/Ph.D.-I/2020/ 9993 **Date:** 23 DEC 2020

To,
The Principal,
SVERI's College of Engineering, Pandharpur,
Tal-Pandharpur, Dist-Solapur-413304.

Subject :- Approval of M.E./M.Tech. Civil Engineering Dissertation Title.

Reference :- RRC Meeting Dated 05/11/2020

Sir/Madam,

With reference to above Subject, I am directed to inform you that, Research & Recognition Committee has accorded approval to the title of **M.E./M.Tech. Civil Engineering** Dissertation, as mentioned overleaf.

You are requested to bring the approval to the notice of concerned guide and students.

Thanking you.

Yours Faithfully,

(Deputy Registrar)
Research Department (Ph.D.-I)

Copy to :-
The Director,
Board of Examinations and Evaluation,
P.A.H., Solapur University, Solapur.

P.T.O.

P.A.H.SOLAPUR UNIVERSITY, SOLAPUR

Statement showing who have applied for M.E. Dissertation in subject of : **M.E. Civil Engineering** **Date : 05/11/2020**

Sr. No.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
1.	**Mr. Dhiraj Vitthal Giribuva** SVERI'S College of Engineering, Pandharpur, Solapur.	Aug-2015	**Dr. M. M. Pawar** SVERI'S College of Engineering, Pandharpur.	An Experimental Study of Properties of Concrete with Partial or Full Replacement of Fine Aggregates Through Copper Slag.	**Approved**
2.	**Miss. Mohite Arti Audumbar** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. P.M. Pawar** SVERI's College of Engineering, Pandharpur, Solapur.	Performance Based Seismic Design Analysis of Steel Frames for Different types of Bracings	**Approved with Modified title "Performance Based Seismic Design Analysis of Steel Frames for Various types of Bracings"**
3.	**Miss. Umbare Jayshree Ramchandra** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. P.M. Pawar** SVERI's College of Engineering, Pandharpur, Solapur.	Progessive Collapse Analysis of Moment Resisting Steel Frames for Failure Performance Improvement	**Approved**
4.	**Mr. Maske Sameer Suhas** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Prof. M. M. Pawar** SVERI's College of Engineering, Pandharpur, Solapur.	Assessment of Response Reduction Factor for High Rise Irregular Structures	**Approved**
5.	**Mr. Jadhav Ravikiran Pandurang** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. P.M. Pawar** SVERI's College of Engineering, Pandharpur, Solapur.	Analysis of Components of Frame for Improving the Integrity Performance	**Approved**
6.	**Mr. Waghmare Rohit Hanamant** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. S.A. Gosavi** SVERI's College of Engineering, Pandharpur, Solapur.	Analysis of box culvert with non-prismatic members for various aspect ratio of cells	**Approved with Modified title "Analysis of box culvert with non-prismatic members for various aspect ratio of cells"**

Statement showing who have applied for M.E. Dissertation in subject of : **M.E. Civil Engineering** **Date : 05/11/2020**

Sr. No.	Name of Students and Address	Batch	Name of Guide and Address	Topic of Research work	Recommendations of RRC (with reason)
7.	**Mr. Kamble Vishwanath Tukaram** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. V. S. Kshirsagar** SVERI's College of Engineering, Pandharpur.	Analysis of Seismic Performance of Structure with Floating Column	**Approved with Modified title "Seismic Performance of Structures with Floating Columns"**
8.	**Miss. Patil Swati Dattatray** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. S. A. Gosavi** SVERI's College of Engineering, Pandharpur.	Analysis and Design of Multistorey Building for Defferent Grades of Steel in Various Seismic Zones	**Approved with Modified title "Comparative study of RCC multi-storey building for various grades of steel in various seismic zones"**
9.	**Mr. More Sajjanrao Shivajirao** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. M. M. Pawar** SVERI's College of Engineering, Pandharpur.	Progressive Collapse Analysis of RCC Framed Structure	**Approved**
10.	**Miss. Thite Trupti Somnath** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. P. M. Pawar** SVERI's College of Engineering, Pandharpur.	Strengthening of cantilever wall against lateral loading	**Approved**
11.	**Mr. Aiwale Hari Dharma** SVERI's College of Engineering, Pandharpur, Solapur.	Aug-2019	**Dr. V. S. Kshirsagar** SVERI's College of Engineering, Pandharpur.	To Determine the Alternative Materials for River Sand To Apply in Mortar for Brick Masonry	**Approved with Modified title** "Identification of the Alternative Materials for River Sand for Brick Masonry Construction"
12.	**Mr. Koshti Ganesh Kumar** SVERI'S College of Engineering, Pandharpur, Solapur.	Aug-2015	**Dr.M. M. Pawar** SVERI'S College of Engineering, Pandharpur.	Comparative Study of Structural Responses of Floating Column and Non-Floating Column Structural Frames	**Approved with Modified title** "Comparative Study of Structural Responses of Structural Frames with Floating Columns"
13.	**Mr. Shubham M. Jadhav** SVERI'S College of Engineering, Pandharpur, Solapur.	Aug-2015	**Dr. S. A. Gosavi** SVERI'S College of Engineering, Pandharpur.	Progressive Collapse Analysis of Reinforced Concrete Multistoried Frame Structure	**Approved**

(Deputy Registrar)
Research Department (Ph.D.-I)

SHRI VITHAL EDUCATION & RESEARCH INSTITUBE'S

COLLEGE OF ENGINEERING, PANDHARPUR.

Department of Civil Engineering

Dessertation Phase-II Progress Seminar

Acad Year:2019-20 **Class-ME (2nd Year)**

Sr. No.	Seat No	Name of Student	Disertation Phase II: Progress Seminar
1	825139	BAGAL SRUSHTI CHANDRAKANT	97
2	825140	JADHAV SUREKHA MAHADEV	97
3	825141	INGALE SUJATA JANARDHAN	97
4	825144	ABHANGRAO CHAITALI RAJENDRA	97
5	825146	MANE YOGESH GURURAJ	92
6	825147	LACHYAN POOJA SHIVANAND	97
7	825148	MAHAMUNI NISHIGANDHA VAIJINATH	97
8	825151	SHAHABADE VIKRANT BABURAO	90
9	825152	PATIL SWAPNIL MOHAN	97
10	825153	PAWAR PRASAD SHIVAJI	94
11	825155	GADE SHUBHAM RAJABHAU	90
12	825157	DESHMANE SHWETA ANIL	92
13	825158	AIWALE HARI DHARMA	90

(Dr. P.M. Pawar)
H.O.D. Civil Dept.

HEAD,
Dept. of Civil. Engg.
C.O.E. Pandharpur

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Sample Synopsis Report

, A

Synopsis On

"Analysis of Cement Performance Using Microscopic Analysis Techniques"

Submitted to

पुण्यश्लोक अहिल्यादेवी होळकर
सोलापूर विद्यापीठ
।। विद्यया संपन्नता ।।

Punyashlok Ahilyadevi Holkar Solapur University

Submitted by

MISS. CHAITALI RAJENDRA ABHANGRAO

For partial fulfillment post-graduation in M-tech Structure Civil Engineering as per Requirement **Punyashlok Ahilyadevi Holkar Solapur University**

For the academic year 2019 –20

Under the Guidance of

Dr.P.M.Pawar

SVERI

SVERI'S College Of Engineering ,Pandharpur

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SVERI'sCOLLEGE OF ENGINEERING, PANDHARPUR
Gopalpur -Ranjani Road, Gopalpur, P.B. No. 54, Tal - Pandharpur- 413 304,
Dist. Solapur (Maharashtra)
(Approved by AICTE, New Delhi and affiliated to PAH Solapur University, Solapur)
Year -2019-20

CERTIFICATE

This is to certify that the synopsis entitled

"Analysis of Cement Performance Using

Microscopic Analysis Techniques"

submitted by

MISS. CHAITALI RAJENDRA ABHANGRAO

is hereby scrutinized and approved by Civil Engineering departmental PG synopsis approval committee and forwarded toPunyashlokAhilyadeviHolkarSolapur University authorities for approval of PG synopsis.

Dr. P. M. Pawar
(Guide)

Prof. M. M. Pawar
(Committee Member-I)

Prof. S. A. Gosavi
(Committee Member-II)

(Panel of PG Synopsis approval Committee)

Dr. V. S. Kshirsagar
(PG Coordinator, civil)

Dr. P. M. Pawar
(HOD, civil)

Dr. B. P. Ronge
(Principal)

Scanned with CamScanner

Synopsis Presentation And Review Report

(By the college department committee)

M.Tech- Structure (Civil Engineering)

Part-II Semester-III

Name of College :SVERI's College of Engineering, Pandharpur.

Name of Student : Miss. Chaitali Rajendra Abhangrao.

Admission Year (To First Year): 2018

Title of Dissertation: "Analysis of Cement Performance Using Microscopic Analysis Techniques"

Synopsis Presentation Date:

The student has presented the synopsis and is recommended for submission toPunyashlokAhilyadeviHolkar Solapur University, Solapur.

(a) With necessary correction for the following suggestions.

(b) Suggestions given by committee:

Dr. P. M. Pawar (Guide)	**Prof. M. M. Pawar** (Committee Member-I)	**Prof.S. A. Gosavi** (Committee Member-II)

Suggestions Implemented and Reviewed:

Synopsis of above student has been reviewed & recommended for approval after necessary corrections as per the above suggestions for submission toPunyashlokAhilyadeviHolkar Solapur University, Solapur.

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SYNOPSIS:

1. Name of the College : SVERI's College of Engineering, Pandharpur.

2. Name of the Course : M.Tech.(Structure) Civil Engineering

3. Name of the Student : Miss. Chaitali Rajendra Abhangrao.

4. Month of Registration : August 2018

5. Name of the Guide : Prof.Dr. P. M. Pawar.
HOD of Civil Department

6. Proposed Title of the Dissertation : "Analysis of Cement performance Using Microscopic Analysis Techniques."

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INTRODUCTION:

Cement is the binding material. Portland cement is manufactured by crushing, milling and proportioning the following materials Lime or calcium oxide, CaO: from limestone, chalk, shells, shale or calcareous rock. Silica, SiO_2: from sand, old bottles, clay or argillaceous rock. Alumina, Al_2O_3: from bauxite, recycled aluminum, clay. The Portland cement represents a mixture of clinker and finely ground gypsum, where the clinker is made up of four main mineral components Alite (C3S),Belite(C2S),Celite I (C3A), Celite II (C4AF). Portland cement concerning the cement hydration processes performed at various time intervals using XRD. Portland cement Hydration Process highlighted the presence of hydration compounds as well as of mineral compounds with the help of two methods XRD and SEM.The methods used X-ray diffraction and Scanning electronic microscopy applied to define materials and to understand the changes occurring in mineral compounds (alite, belite, celite and brownmillerite) during their modification into hydrated mineral compound. X-ray diffraction method (XED) is used in hydration compounds for identification of the mineral phases, Scanning electronic microscopy (SEM) is powerful technique used in examination of material properties mostly used in metallurgy , geology, biology and medicine. The use of the mentioned methods allows more accurate information regarding the behaviour of the Portland cement paste during hydration, and a more realistic knowledge of the mechanisms that generate new properties such as strength and durability, which are among the most important in the selection of cement for a specific application.

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PRESENT THEORIES AND PRACTICES:

Some of the recent and most relevant works are summarized below:

Serban,L.[1] mentioned that XRD and Scanning Electron Microscopy (SEM) gives accurate information regarding to the Portland cement past during the hydration and provided knowledge of few new properties such as strength and durability.At a maximum temperature of up to 1450°C. In the clinker, the calcium silicates represent 75 - 80 %, hence the name of silicate cements, while calcium aluminates and calcium aluminoferrite form only 20 – 25 % .

Neville [2] has presented a review the cement hydration products are poorly soluble in water. The hydration processes of cement particles was not completed immediately speed of hydration gradually diminishes. According to his study the Alite (C3S) is found in cement in largest ratio (50%). Belite (C2S) is the mineral component that has the form of crystal in clinker when slowly cooled down.

Ionescu et al.[3] mixtured of clicker and finely ground gypsum in the Portland cement, where clinker was made of four minerals component Alite (C3S), Belite(C2S),Celite I (C3A),Celite II (C4AF) . The methods used concern X-ray diffraction and electronic microscopy applied to define materials and to understand the changes occurring in mineral compounds (alite, belite, celite and brownmillerite) during their modification into hydrated mineral compounds (tobermorite, portlandite and etringite).

Molnar et al.[4] The hydration and hydrolysis reactions of the two mineral compounds above also produce hydrosilicates that initially have a gel structure similar to that of the natural mineral called tobermorite. The calcium silicate hydrates form the majority of the hydration products, present a gel structure, where the solid phase is made up of a lattice of microcrystals, initially of angstrom size with eyes filled with a saturated composition of components: in a later stage, the crystals develop, age and strengthen, leading to the increase of the mechanical strength

Jumate et al.[5] studied about Hydration Process which highlighted the crystallographic texture, size of the crystallite, internal stresses in sample. Phase qualitative and quantitative analysis also be done by using XRD. If the respective phase shows 3-4% or more than that ,then crystalline phase identify byBragg's relationship and other also.

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OBJECTIVE:

- To design experiments for studying the influence of curing parameter attainment of cement strength performance.
- To design experiments for studying the influence of various chemical admixtures on cement performance.
- To perform microscopic analysis of cement mortar with and without cured and compares it with strength results.
- To perform microscopic analysis of cement mortar to understand influenced chemical admixtures and related to strength.

METHODOLOGY:

- ***To design experiments for studying the influence of curing parameter attainment of cement strength performance.***

  Preparation of cement mortar specimen size (7x7) cm. We are going to prepare 32 number of specimen. From total specimens half of specimens we will kept for hydration in curing tank and remaining half (16 specimen) kept for non curing test. For achieving the result we choose the time period as 1, 3, 7, 14 and 28 days. Select randomly any three specimens for UTM test at each decided time period. Note down best result from specimen. (Mentioned procedure is carried out for both the part curing and non curing.)

- ***To perform microscopic analysis of cement mortar with and without cured and compares it with strength results.***

  From strength result preserve some part for SEManalysis. Select any one specimen for each day testing.Take few sample powder from above selected specimen for XRD analysis. Mentioned procedure carried out upto the 28 day hydration. (Mentioned procedure is carried out for both the part curing and non curing.) And compare the result.

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- ***To design experiments for studying the influence of various chemical admixtures on cement performance.***

  Procedure is same as mentioned in above two point.Add some Plasticizers while preparing cement mortar specimen (7x7)cm. The time period is fixed as 1,3,7,14 and 28 days. Check out the strength and mineral component for both the cases curing and non curing process .

- ***To perform microscopic analysis of cement mortar to understand influenced chemical admixtures and related to strength.***

  Same way SEM analysis will be carried from specimen in which chemical admixtures is used. Compare the result with previous test and reult after adding admixture.

MATERIALS:

- Portland cement
- Distilled water
- XRD/SEM machine
- UTM machine
- Various types of Admixtures



XRD Machine

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Outline of the Proposed Work:

Phase	Type of Work	Expected Period
1.	Getting introduced with new Microscopic Techniques and a detailed literature survey and study of other similar projects.	1 Months
2.	To find out XRD of cement powder at different time interval and work on Analysis.	1.5 Months
3.	Casting of cement mortar (specimen) and find out the strength on UTM Machine and simultaneously working on Microscopic Techniques after 1 ,3 ,7,14 and 28 days on curing and non curing specimens.	1.5 months
4.	Comparative study of UTM result and Microscopic result Working on analysis.	1 month
5.	With the addition of various admixtures prepare the specimens to understand influence, test it after 1,3, 7, 14 and 28 days on curing and non curing specimens. And find out the strength and SEM/XRD result.	1.5 Months
6.	Comparative study of Microscopic result Working on analysis.	1 Months
7.	Linking of all the subtopics of the work appropriately and writing the final report.	1.5 months
Total Duration		**9 Months**

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AVAILABLE FACILITY:

The following facilities are available at SVERI's College of Enginnering Pandharpur to carry out dissertation work

1) Laboratory facility and Computing facility
2) Books and IEEE journals, Science direct

EXPECTED DATE OF COMPLETION OF WORK: May 2020

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REFERENCES:

1.SERBAN, L. (1998), Materiale de construcii (Building materials), Matrix, Bucureti.

2.NEVILLE, A.M. (2003), Proprietile betonului (Concrete properties), Editura Tehnic, Bucureti.

3.IONESCU, I. and ISPAS, T. (2008), Proprietile i tehnologia betoanelor (Concrete properties and technology), Editura Tehnic, Bucureti.

4.MOLNAR, L., MANEA, D. and ACIU, C. (2010), The study of hydration processes of cement based on latest generation methods, Proceedings of the Internaional Scientific Conference, CIBv 2010, Vol. 1, (November 2010), pp. 215-221, ISSN 1843-6617, Transilvania University Press.

5.JUMATE, E. and MANEA, D.L. (2011), X-Ray difraction study of hydration processes in the Portland cement, Journal Of Applied Engineering Sciences, Vol. 1(14), Issue 1, pp.79-86.

(Ms.Chaitali Rajendra Abhangrao)

Student

(Prof. Dr. P. M. Pawar)

Guide

Date: 28/08/2019.

Place : Pandharpur

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Sample Progress Report

Progress Report

“Design and Analysis of Slabs with Insertion Voids For Weight Minimization.”

Ms. Mahamuni Nishigandha Vaijinath

Institute: SVERI’s College of Engineering, Pandharpur

Department: Civil Engineeering

Course: M. Tech. (Structures)

Academic Year: 2019-20

Guide: Dr. P. M. Pawar

I. INTRODUCTION

General

A slab is a structural element, made of concrete, which is applied to create flat horizontal surfaces such as floors, roof decks, and ceilings. A slab is mainly various inches thick and strengthened by beams, columns, walls, or the ground. In building construction, the slab plays a main structural member. The slab is one of the main parts which consume large concrete. The high weights of concrete cause problems for the concrete slab and also decrease the span length. This is why important improvements in R.C.C have concentrated on improving the span, decreasing the weight, or reducing the natural stress defects of concrete. For this cause important branches of reinforced concrete have focused on becoming the span reducing the weight or overcoming concrete's natural tendency in tension. Voids are used to eliminate the undesirable concrete and reduce the weight of the slab, which improves the structural capacity of the slab and also increase the span length. For the self-weight and raise the stability of the slab we use voids in the slab. However, improving people’s enthusiasm in the residential environment, improves noise, vibration, and the deflection of the slab increase by increase span length, which resulted in raising the slab thickness. This increases the use of construction material such as concrete and steel in the construction. To avoid these disadvantages which were caused by increases in the self-weight of slabs, the voided slab system is used.

Systems of Plastic Voided Slab: Plastic voided slab systems are an option for solid concrete slab construction. Plastic voided slab systems are significantly less than solid concrete slabs while keeping the strength to have large spans. Slabs are extra comfortable because less concrete is used in voided slab construction than solid slab construction. Plastic voided slab methods were first introduced in Europe in the 1990s. After that time, many European companies have patented their systems. Various Systems are as follws:

1. Bubble Deck: In the middle of the 1990s, a new system was produced in Denmark by JorganBreuning to secure the loss of dead weight with more than 30% and giving longer spans between supports which is called bubble deck.



Fig.1 Bubble Deck

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2. Cobiax : The same hollow slab system of creating voids within the concrete slab to lighter the building structure was developed in 1997 South Africa, which was called the cobiax system.

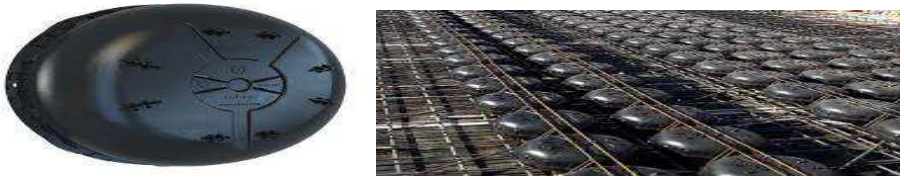

Fig.2 Cobiax System

3. U-Boot Beton: U-Boot Beton a new system of hollow formers to decrease the transportation cost and CO2 product was in 2001 by an Italian engineer, Roberto llGrande. U-Boot Beton, or U-Boot, is a voided slab system from the Italian company Daliform.

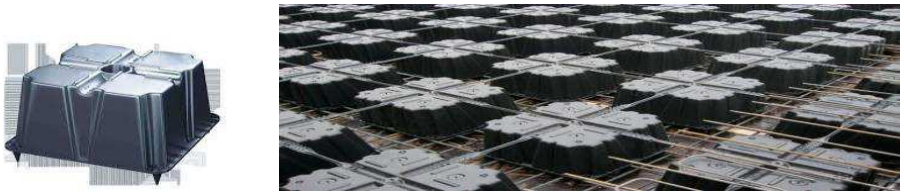

Fig.3 U-Boot Beton System

4 Airdeck: The design, developed in 2003, is Airdeck. The concept of Airdeck is similar to the U-Boot system. The basic uses of Airdeck's former, the use of recycled polypropylene for providing irretrievable void formers that give to preserving the environment.



Fig.4 Airdeck System

1.4.5 Bee Plate System: The BEEPLATE Honeycomb Floor is enough determination for wide span reinforced concrete flat slabs with any suspension. Spans between up to 20 m with floor depths between 34 cm and 70 cm can be provided. By using buoyancy free hollow bodies, construction is particularly easy.



Fig.5 Bee Plate System

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Voided slabs are lightweight when compared to traditional slab construction. Voided slab systems can decrease a dead load of slabs by as much as 35%. The amount of concrete used in the voided slab is 35-50% less than the traditional solid slab. The voided slab is a more time-saving, cost-saving, saving in transportation, material, and labor.

II. LITERATURE REVIEW

Pandharipande and Pathak [1] explained the voided slab by using HDPE balls. The article explained the range of the studies including assessing the flexural strength and performance of voided slab and conventional slab by analytical and experimental work. The slab specimens cast and with 3 kinds Traditional slab, Bubble deck slab and Analysis of slab specimens was done by ANSYS WORKBENCH 16.0 of FEM analysis. It was shown that the B.D.S in practice more beneficial in saving the concrete because of weight reduction. Tandale et.al [2] this paper reviewed several studies done on the voided slab method. All technical parameters of the voided slab method on which experimental studies carried out by authors were listed in this paper systematically. In this paper, the authors compared self-weight of the conventional slab and voided slab with U-Boot Beton respectively. Ghalimath et.al [3] this article explained the behavior of the voided slab by the U-Boot Beton. This section briefly described U-Boot Beton, parts of U-Boot, size of U-Boot. Saranya & Sankaranarayanan [5] this article presented the ultimate load-carrying capacity of slabs with high volume fly ash replacement and also the incorporation of plastic balls in it. This also decreases the overall cost of construction. Shinde et.al [6]this document discussed the comparative research of Flat Plate Slab and Voided Slab Lightened with U-Boot Beton. In this section the design process for flat plate slabs was compared with voided slabs lightened with U-Boot Beton. Pande et.al [7] the report discussed the different structural behavior of voided slab of bubble deck slab and their structural benefits over a traditional concrete slab. In this paper, a Bubble Deck slab has 2D arrangements of voids within the slab to decrease self-weight. In this paper, the bubble deck slab reduces the dead weight, and this reduction discussed by the numerical problem. And also bubble deck slab and flat slab self-weight calculation are calculated manually with an approximated cost. Gore et.al. [8] this paper reviewed several studies done on the voided slab. The comparative study is performed between the analysis of voided and conventional slab method. Ali Omar [9] this paper reviewed several studies done on the voided slab system. The behavior of voided slabs was simulated numerically and carried out experiments on slab specimens with different void shapes, numbers geometry, and reinforcement state. Voided slabs were recommended for roofing and flooring because of lesser self-weight, ease of construction and lighter supporting systems, foundations are required. Naik & Joshi [10] this paper discussed the deal with work carried out to compare the bubble deck voided slab system and conventional flat slab system by finite element analysis using SAP 2000. An additional study was carried out to investigate the seismic behavior of structure due to a decrease in the dead weight of the structure by modeling and analysis of G+12 story structure for 6mx 7m, 7m x 8m, 8mx 9m grid operations. The findings may show that the slabs momentum is condensed by 7 to 10%of the strong flat slab. Yadav & Tambe [11] this paper discussed the studies on the design method for the plastic voided slab is compared with reinforced concrete solid flat slab through a design comparison of typical bays. Bhagat & Parikh [12]the paper presented the various parameters of the voided and solid flat plate slabs are calculated to relate both systems. To evaluate the appearance of the R.C.C voided and solid flat plate slabs, modeling of slabs is carried out using SAP 2000 with different spans.

III. MATERIAL AND ITS PROPERTIES

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1 **Selection of Materials:** The voided slab is composed mainly of steel, plastic, P.C.C., and concrete:

Table 1

Material Properties

Sr. N0.	Name of Material	Property	Value
1.	**P.C.C. (M15 grade)**	Modulus of Elasticity (E) in MPa.	22630
		Density of Concrete(ρ) in Kg/m^3	2400
		Poisson’s Ratio(μ)	0.167
		P.C.C. Compressive Ultimate Strength in MPa.	15
2.	**Concrete I)For M20 Grade**	Modulus of Elasticity (E) in MPa.	22360.679
		Density of Concrete(ρ) in Kg/m^3	25000
		Poisson’s Ratio(μ)	0.2
		Compressive Ultimate Strength in MPa	20
	II)For M25 Grade	Modulus of Elasticity (E) in MPa.	25000
		Density of Concrete(ρ) in Kg/m^3	25000
		Poisson’s Ratio(μ)	0.2
		Compressive Ultimate Strength in MPa	25
	II)For M30 Grade	Modulus of Elasticity (E) in MPa.	27386.127
		Density of Concrete(ρ) in Kg/m^3	25000
		Poisson’s Ratio(μ)	0.2
		Compressive Ultimate Strength in MPa	25
4.	**Steel**		
	I)Fe415 Grade	Modulus of Elasticity (E) in MPa.	20000
		Density of Concrete(ρ) in Kg/m^3	7850
		Poisson’s Ratio(μ)	0.3
		Tensile Yield Strength in MPa	415
	I)Fe500 Grade	Modulus of Elasticity (E) in MPa.	2.18X10^{11}
		Density of Concrete(ρ) in Kg/m^3	7850
		Poisson’s Ratio(μ)	0.3
		Tensile Yield Strength in MPa	500
5.	**HDPE Balls**	Modulus of Elasticity (E) in MPa.	950
		Density of Concrete(ρ) in Kg/m^3	1030
		Poisson’s Ratio(μ)	0.4

IV. ANALYTICAL STUDY

The effective dimension of the P.C.C. slab is 3150mmX4200mmX210mm and for voided slab No. of voids=9 with the same dimension. And the diameter of the void is 120mm. With the slab fixed supported at four edges in both cases. Assume the density of concrete is 2400 Kg/m3. Calculate the weight in concrete and compare.

a) Without Voids Calculation: Dimension of Slab: 3150mmX 4200mm = 3.15m X4.20m Thickness: 210mm=0.21m.

Volume of P.C.C. Slab without Voids (V1) = L X B X t = 3.15X4.20X0.21 = 2.7783m3.

b) With Voids Calculation:

Dimension of Slab: 3150mmX 4200mm = 3.15m X4.20m

Thickness: 210mm=0.21m

No of Voids in P.C.C. Slab = 9No’s.

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Diameter of Each Voids=120mm.

Volume of Voids in the Slab (V2) = 9X (Π/4) X d^2 X 4.2

= 9X (Π/4) X 0.12^2 x 4.2

Volume of Voids (V2) in the Slab= 0.4275m^2.

Volume of P.C.C. Slab with Voids V = (V1-V2) = 2.7783-0.4275

Volume of P.C.C. Slab with Voids=2.3508m^3.

Weight Calculation: Weight of P.C.C. Slab without Voids (W1) = (ρc) X V1= 24 X 2.7783 = 66.6792KN

Weight of P.C.C. Slab without Voids (W1) =6667.92 Kg.

Weight of P.C.C. Slab with Voids (W2) = (ρc) X V= 24 X 2.3508 =56.4190KN=5641.90Kg.

Weight Reduction in the Slab (%):

Weight Reduction = 100 - (W2/W1) X 100= 100 - (5641.90/6667.92) X 100

Weight Reduction= 15.387%

For R.C.C. Slab:

Similarly in R.C.C. Slab With and Without Voids the weight Reduction in % = 25.65%

Modelling

A. Engineering Data

To have the model of correct behavior it's important to define the type of material, along with its mechanical properties using the Engineering Data cell. The model deformation response will depend on the material defined. The properties of Slab entered in the engineering data cell are shown in Fig.

B. Geometry

To create the geometry of Slab we are going to use the Design Modeler program. Using the Design Modeler we will 'draw' our system part(s) using basic drawing tools and then extrude our 2D cross-sections into 3D elements. Fig. shows the geometry of the Slab.

C. Material Assignment

A new mechanical window allows the assignment of material. In the this case, there is only one material color shown. The assignment of material is shown in Fig. .

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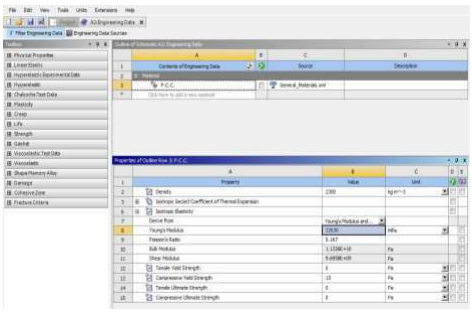

Fig 6 Engineering Data Window with Properties of S355

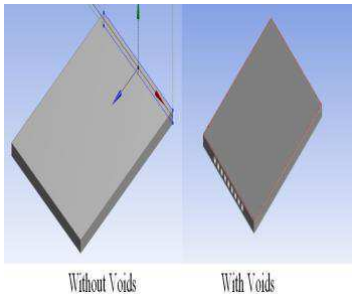

Fig. 7 Geometry

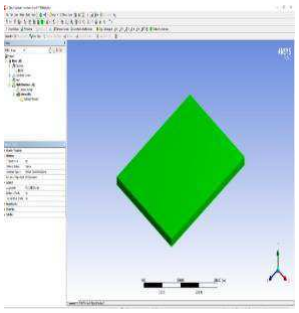

Fig. 8 Material Assignment

D. Meshing

After assigning the material, the mechanical window also allows working on the meshing of a slab with and without voids. A mesh is needed to run a Finite Element Analysis (FEA). The mesh takes the 3D part and represents it as many small elements that are connected by nodes. The FEA cannot run without having a mesh defined. And once the mesh is generated it will appear on 3D as shown in Fig. 4.

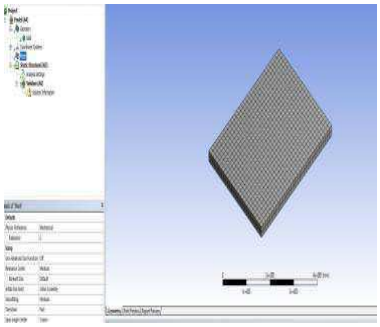

Fig. 9 Meshing

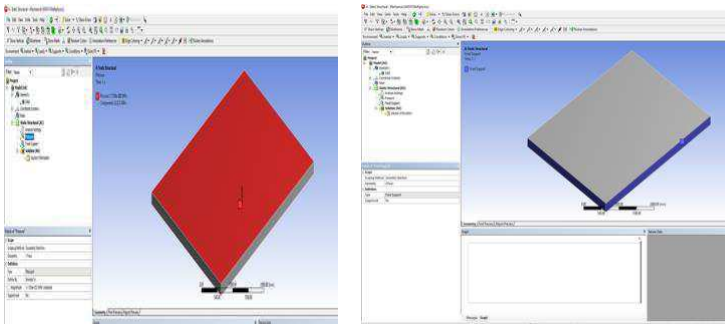

Fig. 10 Loading and Support Condition

E. Setup

Use the Setup cell to launch the appropriate application for that system. Using these options we can define loads and boundary conditions. For our current system, we are going to apply a concentrated force of 4000 KN and fixed support at the bottom which is shown in Fig. 5.

F. Results

To run the analysis and to set-up a viewer for the Axial Deformation we are going to select Solution->Insert->Deformation- >Total. Similarly to set-up a viewer for the Equivalent Stress we are going to select Solution->Insert->Stress->Equivalent Stress.

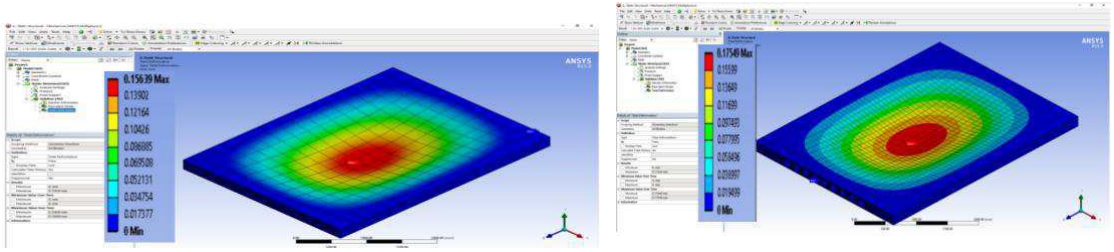

Fig. 11 Total Deformation (mm)

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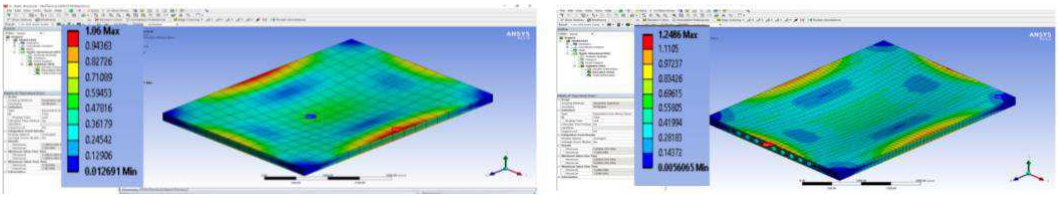

Fig. 12 Equivalent Stress (MPa)

V. RESULTS

After analyzing the slab with the same geometry and support condition subjected to different loads, the results are obtained are shown in Table 2. And also for P.C.C. and R.C.C. slab with and without HDPE Balls as voids.

Table 2

Variation of maximum equivalent stress and total deformation with varying thickness

PCC Slab with Varying Thickness					
Sr. No.	Thickness (mm)	Without Voids		With Voids	
		Maximum Equivalent Stress (MPa)	Maximum Total Deformation (mm)	Maximum Equivalent Stress (MPa)	Maximum Total Deformation (mm)
1	180	1.233	0.2102	1.4299	0.2438
2	190	1.2	0.1944	1.4264	0.2224
3	200	1.206	0.1738	1.3159	0.1964
4	210	1.06	0.1563	1.2486	0.1754
5	220	0.967	0.1366	1.1185	0.1524
6	230	0.917	0.1242	1.0608	0.1381
7	240	0.872	0.1138	1.0217	0.1257
8	250	0.832	0.1045	0.9751	0.1153

Table 3

Variation of maximum equivalent stress and total deformation with different grade

RCC Slab with Varying Grades				
Grade of Concrete and Steel	Without Voids of HDPE Balls		With Voids of HDPE Balls	
	Equivalent Stress Maximum (MPa)	Total Deformation Maximum (mm)	Equivalent Stress Maximum (MPa)	Total Deformation Maximum (mm)
M20 & Fe415	0.088602	0.0004635	0.087502	0.0004735
M25& Fe415	0.0888	0.0004146	0.087602	0.0004146
M30 & Fe500	0.089512	0.0003457	0.088602	0.0003785

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VI. CONCLUSION

8.1 Conclusion

The following are the various conclusions occur in this study as per analysis:

1. The voided slab technology is very advanced, economical, and fastest method of construction of a slab. The usage of this technology is very rare due to a lack of awareness in our country.

2. The weight of concrete in P.C.C. slab by insertion of voids along length reduces the weight up to 15.387%. Due to Concrete usage is reduced, this avoids the cement production. And also reduces the cost of cement.

3. The weight of concrete in R.C.C. slab by insertion of HDPE Balls as voids reduces the weight up to 25.65%. Due Concrete usage is reduced, by Recycled HDPE plastic balls replaces the concrete. This avoids the cement production and allows a reduction in global CO2 emission. Hence this technology is environmentally green and sustainable. And Step towards Green Building.

4. The Stress and deformation coming on the voided slab in P.C.C. and R.C.C. slab are within the permissible limit. The deformation of the voided slab is found to be more than the solid slab in both P.C.C. and R.C.C. slab.

5. The ideal solution for creating slabs with great load - bearing capacity.

8.2 Future Scope

- Voided slab allow architectural freedom of design with non - rectilinear plan forms. Instead of rectangular and square old shape slabs we got the liberty to design any shape as per our design any shape as per our desire thus enhancing the aesthetic view of the structure.
- The ideal solution for creating slabs with large span.
- It is particularly suited for structures that required considerable open spaces, such executive, commercial and industrial buildings as well as public, civil and residential structure.

A

DISSERTATION

ON

"Structural Behaviour Of Voided Beam."

Submitted to

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Submitted by

Mr.Shubham Rajabhau Gade

In the partial fulfillment for the award of
M. Tech. (Structure)

Under the Faculty of Engineering and Technology

Under the Guidance of

Prof. M.M. Pawar

Department of Civil Engineering

SVERI

SVERI's COLLEGE OF ENGINEERING, PANDHARPUR

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P. G. Co-ordinator	**Head, Civil Engg. Dept.**	**Principal**

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A

DISSERTATION

ON

" Comparative study of strength properties of Green Concrete and Conventional Concrete"



Submitted to

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Submitted by

Mr.Prasad Shivaji Pawar

In the partial fulfillment for the award of

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Under the Faculty of Engineering and Technology

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DISSERTATION

ON

"Ultrasonic Pulse Velocity Performance Analysis of Concrete Under Various Conditions."

Submitted to



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Submitted by

Ms. Sujata Janardhan Ingale

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M. Tech. (Structures)

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Sample Thesis

A

DISSERTATION REPORT

ON

"PERFORMANCE BASED SEISMIC DESIGN ANALYSIS OF STEEL FRAMES"

SUBMITTED IN PARTIAL FULFILLMENT

FOR THE AWARD OF

MASTERS OF TECHNOLOGY

IN

STRUCTURAL ENGINEERING

PUNYASHLOK AHILYABAI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

SUBMITTED BY

1. BAGAL SRUSHTI CHANDRAKANT. (Roll No. 03)

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"PERFORMANCE BASED SEISMIC DESIGN ANALYSIS OF STEEL FRAMES"

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DECLARATION

I hereby declare that dissertation entitled **"PERFORMANCE BASED SIESMIC DESIGN ANALYSIS OF STEEL FRAMES"** completed and written by me has not previously formed the basis for the award of any degree or diploma or other similar title of this or any other university or examining body.

Place: Pandharpur.

Date:

(Miss. Bagal Srushti Chandrakant)

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ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of my dissertation work would be incomplete without the mention of people who are responsible for the completion of the project. I wish to express my sincere and heartfelt gratitude to those, whose timely guidance has made me accomplish my dissertation work satisfyingly. It gives me an immense pleasure and satisfaction to express my deep sense of gratitude to my guide **Dr. P. M. Pawar** , Dean Academics and Head, Department of Civil Engineering SVERI's, COE Pandharpur, for his encouragement and guidance towards making this dissertation work successful.

I express my sincere gratitude and thanks to **Prof. M. M. Pawar**, Campus Director, Associate Professor, Department of Civil Engineering, SVERI's COE Pandharpur, for his patience, motivation, valuable advice and support which helped me complete the dissertation work successfully without any hindrance.

I am greateful to **Dr. V. S. Kshirsagar and Prof. Dr. S. A. Gosavi**, Assistant Professor and Assistant Head, Department of Civil Engineering, SVERI's COE Pandharpur, for thier moral support throughout my dissertation work.

I would like to thank the members and all professors, Department of Civil Engineering, SVERI's COE Pandharpur, for their support and guidance throughout the completion of my dissertation work.

It is a pleasure to express my gratitude wholeheartedly to the non-teaching staff of Department of Civil Engineering, SVERI's COE Pandharpur, for their indispensable help during the laboratory work.

It is a pleasure to express my gratitude wholeheartedly to **Er. Laxman N. Kawathe and Er. Sambhaji N. Kawathe** for their valuable advice and help throughout my dissertation work.

Finally, I take this opportunity to extend my gratitude and respect to family and friends for their continuous support and guidance and being source of inspiration.

Bagal S. C.

SRUSHTI C. BAGAL

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CHAPTER 1

INTRODUCTION

1.1MOTIVATION

The destructive impact of natural disasters has become increasingly evident over the past decades. The socio-economic consequences of these incidents are important and can take decades to resolve. Fig. 1 displays the losses from early last century due to natural disasters.Since the 80's a major increase of the amount of losses has been observed as one can conclude from the data shown. While this phenomenon can be explained by various factors, it is accepted that certain circumstances play a decisive role:

(i) Growing population density in already densely populated cities in high-risk areas.
(ii) A rise in living standards, with a resulting rise in property and infrastructure prices.
(iii) A lack of sufficient preparedness and readiness to cope with the disaster consequences.

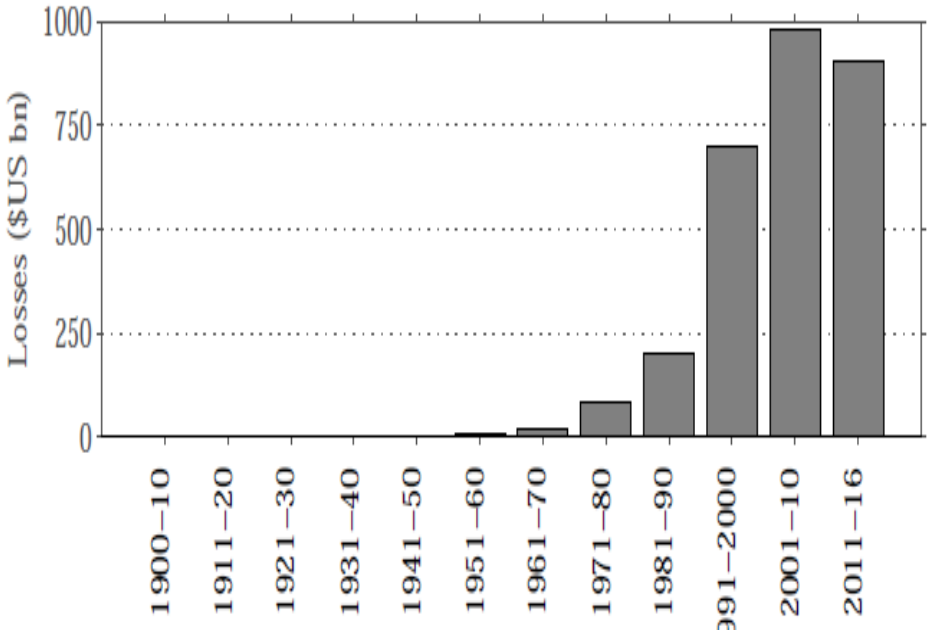


Fig 1. 1Losses due to natural disasters from 1900-2016 (source: http://www.emdat.be/)

Earthquakes are perhaps among the most damaging typologies of natural disasters, with major economic, environmental and cultural implications. Fig. 1.1 displays the categories of the world's most expensive and deadly incidents in recent decades.

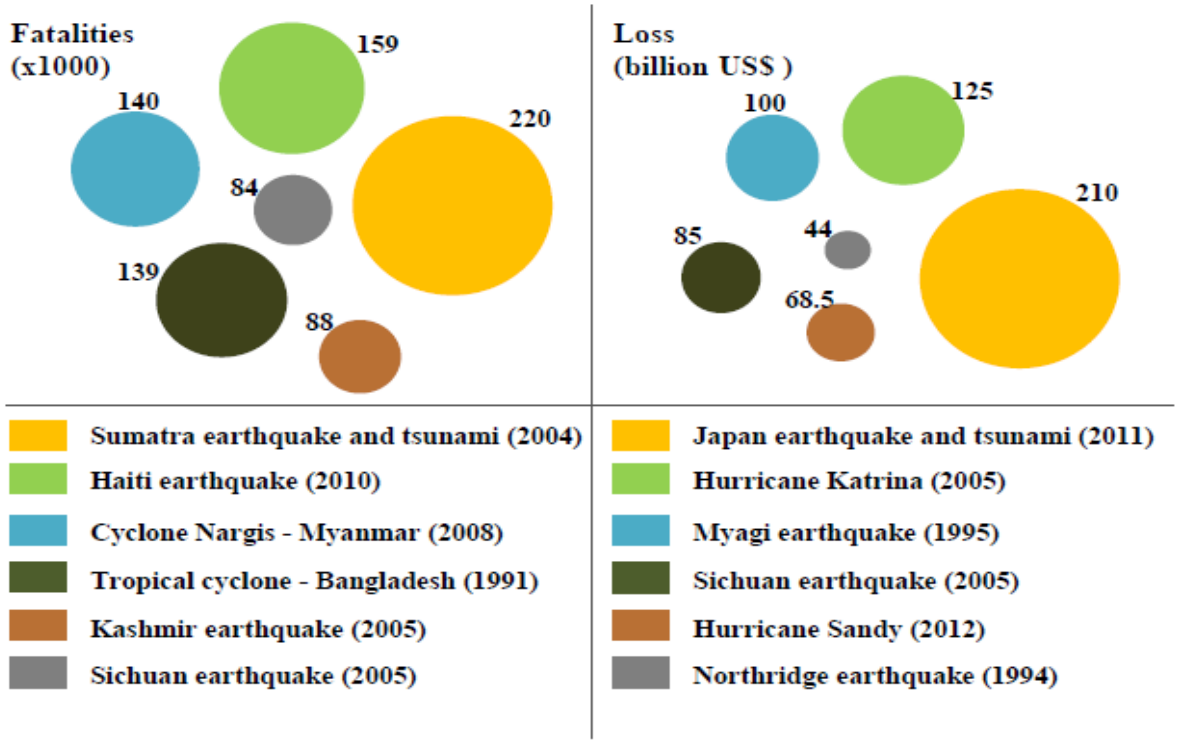


Fig 1. 2Losses due to natural disasters from 1900-2016 (source: http://www.emdat.be/)

As can be observed from Fig.1.2, earthquakes have a remarkable significance in terms of the number of deaths and immediate economic damages among the various forms of natural disasters. In addition, there seems to be no clear connection between the incidents with the highest tolls to human life and the economy, as no natural catastrophe is replicated in both categories shown in Fig.2.These two parameters are in fact closely related to the socio-economic characteristics and growth level of the affected areas. For example, the 2010 Haiti earthquake was responsible for a large number of deaths that could be caused by the lack of appropriate earthquake-resistant construction practices, as well as the insufficient building stock quality. These wide and highly populated urban areas in developing countries placed rapid building and infrastructure growth that typically showed inadequate quality and safety standards. In addition, the lack of preparedness in developed countries for the problems associated with post-earthquake scenarios is also a critical concern regarding the number of fatalities reported.With respect to the earthquakes which caused significant economic losses (e.g. 2011 T¯ohoku, Japan, 1995 Kobe, Japan, 1994 Northridge, USA, 2010 Chile, 2011 Christchurch, New Zealand), the losses were largely associated with the disruption of the sector.Although most of the structures behaved as planned, namely with regard to safeguarding life-safety (as per design requirements), significant damage rates (mainly in the non-structural elements) resulted in significant repair times and, in some cases, inconvenient repair costs.Consequently, the normative design criteria that existed at the time, which concentrated primarily on preventing structural failure, were questioned. For example, during the 2010 Chile earthquake, a substantial number of hospitals (15), within a distance of 500

km to the epicenter,were required to stop operating due to significant non-structural damage.Following table 1.1 provide information about earthquakes occurred in India which suggests the level of disaster caused due to earthquakes.

Table 1. 1History of Earthquakes in India

Date	Location	Mag.	I	Deaths	Injuries	Total damage / notes
2017-01-03	India, Bangladesh	5.7 Mw	V	3	8	
2016-01-04	India, Myanmar, Bangladesh	6.7 Mw	VII	11	200	
2015-10-26	Afghanistan, India, Pakistan	7.7 Mw	VII	399	2,536	
2015-05-12	Nepal, India	7.3 Mw	VIII	218	3,500+	
2015-04-25	Nepal, India	7.8 Mw	IX	8,964	21,952	$10 billion
2013-05-01	Kashmir	5.7 Mw		3	90	$19.5 million
2011-09-18	Gangtok, Sikkim	6.9 Mw	VII	>111		
2009-08-10	Andaman Islands	7.5 Mw	VIII			Tsunami warning issued
2008-02-06	West Bengal	4.3 Mb		1	50	Buildings damaged
2007-11-06	Gujarat	5.1 Mw	V	1	5	Buildings damaged
2006-11-29	Alwar district, Rajasthan	4.0 Mw		1	2	Minor damage to property

Date	Location	Mag.	I	Deaths	Injuries	Total damage / notes
2006-03-07	Gujarat	5.5 Mw	VI		7	Buildings damaged
2006-02-14	Sikkim	5.3 Mw	V	2	2	Landslide
2005-12-14	Uttarakhand	5.1 Mw	VI	1	3	Building destroyed
2005-10-08	Kashmir	7.6 Mw	VIII	86,000–87,351	69,000–75,266	2.8 million displaced
2002-09-13	Andaman Islands	6.5 Mw		2		Destructive tsunami
2001-01-26	Gujarat	7.7 Mw	X	13,805–20,023	~166,800	
1999-03-29	Chamoli district-Uttarakhand	6.8 Mw	VIII	~103		
1997-11-21	Bangladesh, India	6.1 Mw		23	200	
1997-05-22	Jabalpur, Madhya Pradesh	5.8 Mw	VIII	38–56	1,000–1,500	$37–143 million
1993-09-30	Latur, Maharashtra	6.2 Mw	VIII	9,748	30,000	
1991-10-20	Uttarkashi, Uttarakhand	6.8 Mw	IX	768–2,000	1,383–1,800	
1988-08-21	Udayapur, Nepal	6.9 Mw	VIII	709–1,450		

Date	Location	Mag.	I	Deaths	Injuries	Total damage / notes
1988-08-06	Myannmar, India	7.3 Mw	VII	3	12	
1988-02-06	Bangladesh, India	5.9 Mw		2	100	
1986-04-26	India, Pakistan	5.3 Ms		6	30	Severe damage
1984-12-30	Cachar district	5.6 Mb		20	100	Severe damage
1982-01-20	Little Nicobar	6.3 Ms			Some	Moderate damage
1980-08-23	Kashmir	4.8 Ms		Few		Limited damage / doublet
1980-08-23	Kashmir	4.9 Ms		15	40	Moderate damage / doublet
1980-07-29	Nepal, Pithoragarh district	6.5 Ms		200	Many	$245 million
1975-01-19	Himachal Pradesh	6.8 Ms	IX	47		
1970-03-23	Bharuch district	5.4 Mb		26	200	Moderate damage
1967-12-11	Maharashtra	6.6 Mw	VIII	177–180	2,272	$400,000
1966-08-15	North India	5.6		15		Limited damage

Date	Location	Mag.	I	Deaths	Injuries	Total damage / notes
1966-06-27	Nepal, India	5.3 Ms	VIII	80	100	$1 million
1963-09-02	Kashmir	5.3		80		Moderate damage
1960-08-27	North India					Moderate damage
1956-07-21	Gujarat	6.1 Ms	IX	115	254	
1954-03-21	India, Myannmar	7.4 Ms				Moderate damage
1950-08-15	Assam, Tibet	8.6 Mw	XI	1,500–3,300		
1947-07-29	India, China	7.3 Mw				
1941-06-26	Andaman Islands	7.7–8.1 Mw		8,000		Destructive tsunami
1935-05-31	Quetta, Baluchistan	7.7 Mw	X	30,000–60,000		
1934-01-15	Nepal	8.0 Mw	XI	6,000–10,700		
1932-08-14	Assam, Myannmar	7.0 Ms				Moderate damage
1905-04-04	Kangra	7.8 Ms	IX	>20,000		

Date	Location	Mag.	I	Deaths	Injuries	Total damage / notes
1897-06-12	Shillong, India	8.0 Mw	X	1,542		
1885-06-06	Kashmir					Severe damage
1885-05-30	Srinagar			3,000		Extreme damage
1881-12-31	Andaman Islands	7.9 Mw	VII			Significant in seismology
1869-01-10	Assam, Cachar	7.4 Mw	VII	2		Severe damage
1845-06-19	Rann of Kutch	6.3 Ms	VIII	Few		Limited damage / tsunami
1843-04-01	Deccan Plateau					Moderate damage
1833-08-26	Bihar, Kathmandu	8.0 Ms				Severe damage
1828-06-06	Kashmir			1,000		Severe damage
1819-06-16	Gujarat	7.7–8.2 Mw	XI	>1,543		Formed the Allah Bund
1618-05-26	Bombay		IX	2,000		Severe damage
1505-06-06	Saldang, Karnali zone	8.2–8.8		6,000		

The steel systems have been a reliable alternative to conventional reinforced concrete approaches over the last few decades. The increasing understanding of environmental protection, combined with improved strength and ductility characteristics, as well as faster construction methods, highlighted the advantages of this structural solution, with attractive and adequate features from a seismic resistant perspective. It is necessary to remember; however, that the use of ductile materials does not automatically result in ductile structures and that robust design criteria enabling the use of all the potential of the material must be met.The degree of damage found in steel structures following the earthquakes in Northridge (USA, America, 1994, 6.7 Mw) and Kobe (Japan, Asia, 1995, 6.9 Mw) prompted the development of research studies and experimental campaigns aimed at improving standards and guidelines for the seismic design of steel structures. Seismic design of steel structures has become a growing research trend in world, particularly since the early 1990s.

From the discussion in the previous section, the value of developing improved design rules becomes apparent, which allow for a reliable prediction of structural performance under seismic loads.

1.2 STEEL

Steel is the most valuable construction material in the world, by far. The steel industry today is the fundamental or main industry in any region. This is about ten times the strength of concrete; steel is the perfect material of modern building. It's mainly benefits are power, erection speed, prefabrication and demount ability. In structures, structural steel is used in load-bearing frames, and as members of trusses, bridges, and space frames. Steel however needs protection against fire and corrosion. Cladding and dividing walls in steel buildings are constructed of masonry or other materials, and a concrete foundation is also supported.Steel is also used in the design of conjoint frames and shear walls. Steel structures tend to be more economical than concrete structures for tall buildings and large span buildings and bridges, due to their high strength to weight ratio. Steel structures can be built very quickly and this makes early use of the structure thereby contributing to the overall production of steel providing much greater compressive and tensile strength than concrete and allowing for lighter construction.

Steel structures should be engineered and secured to withstand corrosion and fire in order to get the most benefit out of steel. They should be planned and comprehensive to be simple to construct and to build. Good quality control is important to ensure that the different structural components are correctly installed. In design the temperature effects should be considered. Steel structures are ductile and strong, and can withstand extreme loads including earthquakes. Steel structures can be patched and retrofitted quickly for handling higher loads.

Steel is one of the most sustainable construction materials for the environment-steel is 100 percent recyclable.The connections and especially the welds should be properly engineered and detailed to prevent cracks forming under fatigue and earthquake loads. Unique steels and corrosion and fire safety measures are available, and the designer should be familiar with the available choices. Since steel is manufactured under better quality control at the factory, steel structures have greater durability and protection.

1.3 HISTORICAL DEVELOPMENT OF STEEL

Steel was used from 3000 BC and used in china and then in Europe between 500-400 BC. In India the steel-made Ashoakan pillar and the iron joints used in Puri temples are over 1500 years old. The modern technology of blast furnace which was built in AD1350 (Guptha 1998)

In the later part of the eighteenth century, the large-scale use of iron for structural purposes began in Europe. The first significant use of cast iron was Darby's 30.4-m-span Coalbroakadale Arch Bridge in England, constructed in 1779 over the Severn River. The use of cast iron persisted until about 1840. Abraham Darby discovered a way in 1740 to turn coal into coke, revolutionizing the method of iron production. HenoryCort discovered a way of wrought iron in 1784, which is heavier, more flexible and has a greater tensile strength than cast iron.Wrought iron chains were used during 1829 in Menai Straits suspension bridge designed by Thomas Telford and Britannia Bridge by Robert Stephenson was the first wrought iron box girder bridge. Steel was first used in 1740, but was not available in large quantities until the method of producing steel was discovered and patented by Sir Henry Bessemer of England in 1855. In 1865, the open-hearth method was discovered by Siemens and Martin and widely used for the manufacture of structural steel. Companies like Dorman Long began rolling steel I-section by 1880.Riveting was used as a means of fastening until about 1950 when it was replaced by welding.Bessemer's steel production in Britain ended in 1974 and last open –hearth furnace closed in 1980.The basic oxygen steel making (BOS) process using the CD converter was invented in Austria in 1953.Today we have several varieties of steel.

1.4 TYPES OF STRUCTURAL STEEL

The structural designer is now able to choose structural steel from the following standardized categories for a specific application.

A. **Carbon steel (IS 2062):** The primary reinforcing elements are carbon and manganese. The defined minimum ultimate tensile strength for these ranges from approximately 380

to 450 MPa and their stated minimum yield strength from approximately 230 to 300MPa(IS 800:2007).

B. **High –strength carbon steel:**This steel is required for structures such as transmission lines and microwave towers. The required ultimate tensile strength of approximately 480-550 MPa and minimum yield strength of approximately 350-400 MPa.
C. **Medium-and-high strength micro alloyed steel(IS 85000):** This steel has low carbon content but, due to the addition of alloys like niobium, vanadium, titanium, or boron, it achieves high strength. The required final tensile strength, ranging from approximately 440-590 MPa, and minimum yield strength of approximately 300-450 MPa.
D. **High-strength quenched steels and temperature steels(IS 2003):**This steel is heat treated to produce a high resistance. The required ultimate tensile strength of approximately 700-950 MPa, and minimum yield strength of approximately 550-700 MPa.
E. **Weathering steels:** This low-alloy atmospheric corrosion-resistant steel has an overall tensile strength of approximately 480 MPa and an performance of approximately 350 MPa.
F. **Stainless steels:** This steel is essential low-carbon steel adding at least 10.5 percent (max 20 percent) of chromium and 0.5 percent of nickel.
G. **Fire resistant steels:** Also known as thermo-mechanically treated steels, they perform better under fire than ordinary steel.

1.5 PERFORMANCE BASED SEISMIC DESIGN

Recent earthquake caused catastrophic damage in overall world. Steel structures are considered mostly earthquake resistant structure but some significant failures have occurred. Recent earthquake events demonstrate the necessity of change in structural design guidelines. To protect and maintain the economic activity and prosperity of a region, the performance of structure caused by earthquake became a major factor. That's why Civil Engineering profession is updating structural design paradigm of life safety (LS) to the performance bases seismic design (PBSD). Conventional seismic design approaches have the purpose of ensuring life safety (strength and ductility) and regulation of damage (drift limits for serviceability). The design parameters are specified by the stress limits and the strengths of the members determined from the prescribed lateral shear force.

Performance-based design is a more general design philosophy in which the design criteria are expressed in terms of achieving stated performance objectives when the structure is subjected to stated levels of seismic hazard. The performance targets may be a level of stress not to be exceeded, a load, a displacement, a limit state or a target damage state. There have been different interpretations of what is meant by performance-based design. The most appropriate definition is that performance-based design refers to the methodology in which structural design criteria are expressed in terms of achieving a set of performance objectives.

Using an appropriate structural system is critical to good seismic performance of the buildings. While moment frame is the most commonly used lateral load resisting structural system, other structural system are also commonly used such as braced system. A bracing is a system offered to reduce lateral structural deflection. Braced frame virtually eliminates bending factors for the column and girders and thus improve the efficiency of mere rigid frame behavior. Already proved that braced frame decreases the displacement of the structure and absorbs more energy during earthquake. But the study does not comment on the effect of the position of the bracing on the structure. Considering this gap, in this study 3 frames are considered one is moment and remaining 2 are braced frame. In that braced frame one frame is externally braced as concluded that external bracings perform well under lateral loads. Second frame is internally braced with optimum position as was that adding braces to the core of building reduces the drift much more than adding them to the facades. Comparative study of three frames is presented in the study to demonstrate which structural design shows best performance under earthquake loadings.

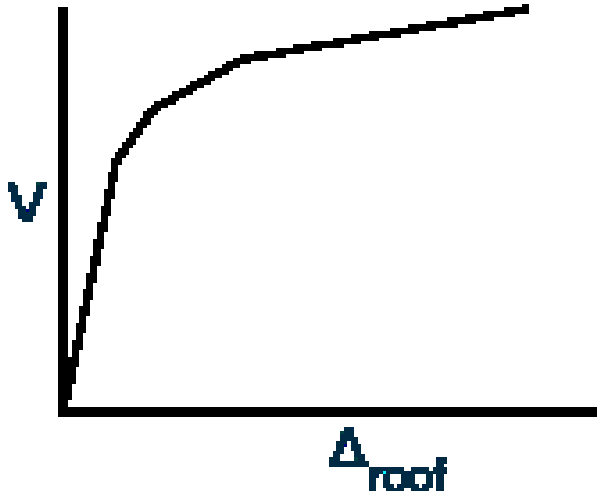
1.6 NONLINEAR PUSHOVER ANALYSIS

Structural frames considered are analyzed in STAAD Pro advanced by nonlinear static analysis, popularly known as pushover analysis which is one type of PBSD. The nonlinear seismic analysis is used in structural Engineering profession to design steel frames for moderate to strong earthquakes. The linear procedures maintain the traditional use of a linear stress-strain relationship but incorporate material acceptance criteria to permit better consideration for probable non-linear characteristics of seismic response. The non-linear static procedure, often called “pushover analysis,” uses simplified nonlinear techniques to estimate seismic structural deformations. As per FEMA 356, a pushover analysis is a static nonlinear way of estimating seismic structural deformations using a simplified, non-linear technique. Earthquake engineering research is progressing rapidly to consider the nature of buildings that have been exposed to powerful earthquakes. Pushover analysis is done to be able to predict such behavior. The overall capacity of a structure depends on the strength and deformation capacities of the structure's individual components. to evaluate capacities beyond the elastic limit some form of nonlinear analysis is needed, such as Pushover Analysis. It is a modern performance based seismic design (PBSD) for analytically achieving a structural design that will work reliably under one or more seismic conditions in a specified manner. There are two nonlinear procedures using pushover methods: a. Capacity Spectrum Method b. Displacement Coefficient Method. In this analysis particularly Capacity Spectrum Method is used.

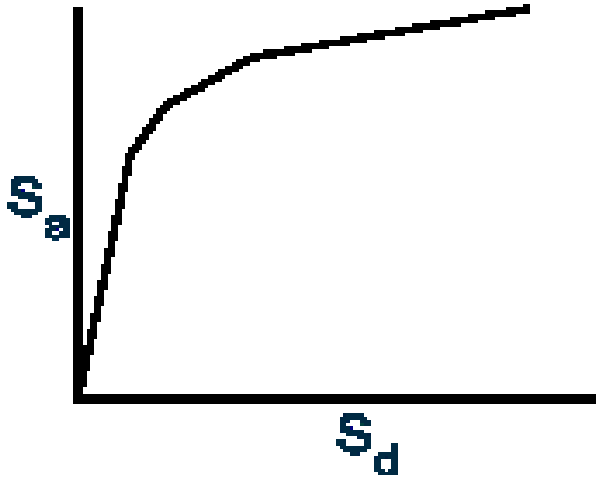
1.6.1 Capacity Spectrum Method

The Capacity Spectrum Method's goal is to establish suitable demand and capacity spectra for the system and to determine its intersection point. During this process, performance of each structural component is also evaluated. The spectrum of capacity is obtained by converting

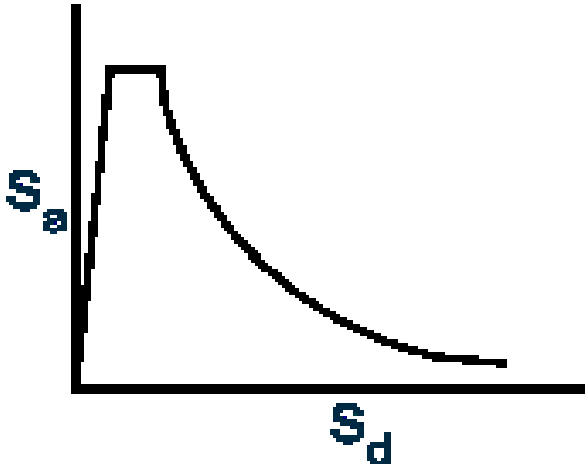
the base shear versus the spectrum of roof displacement into a spectral acceleration versus the spectral displacement as shown in Fig1.3(a). The intersection between a corresponding demand curve and the capacity curve is called the performance point.Capacity curve, in terms of base shear and roof displacement, is converted to capacity spectrum, which is a representation of the capacity curve in Acceleration Displacement Response Spectra (ADRS) format (i.e., Sa versus Sd) as shown in Fig1.3(b). This curve is obtained by redrawing the design earthquake response spectra as a curve of spectral acceleration v/s spectral displacement as shown in Fig 1.3(c).



(a)



(b)



(C)

Fig 1. 3Curves in capacity spectrum method: (a) Roof deflection, Δroof, plotted versus base shear, V; (b) Spectral displacement, Sd plotted versus spectral acceleration, Sa; (c) Response spectrum

1.7 PERFORMANCE PARAMETERS

Performance level of structures against earthquakes describes limiting damage condition that assumed to be satisfactory for a given building and a given ground motion.Moreover, building damages, danger to life safety of occupants in the building due to the damage, and post-earthquake serviceability of the building describe and control the limiting damage condition.Added to that, building performance level against earthquakes is a combination of the performance of both structural and nonstructural components.Lastly, performance levels of building structures against earthquake will be presented in the following sections.



Fig 1. 4Performance Level Parameters

Performance levels of buildings against earthquakes are as follows:

- Immediate occupancy performance level (IO)
- Life safety performance level (LS)
- Collapse prevention performance level. (CP)



Fig 1. 5Immediate Occupancy (IO) Performance Level

Immediate occupancy performance level

- The structure experience light damages
- There is no permanent drift.
- The building retains original strength and stiffness substantially.
- Minor cracking of facades, partitions, and ceilings as well as structural elements.
- Elevators can be restarted.
- Fire protection operable.
- The building space and systems are anticipated to be fairly usable. however, equipment and contents are generally secure but may not operate due to mechanical failure or lack of utilities.
- Concrete frame experience minor hairline cracking, limited yielding at few locations, and no crashing (strain of concrete less than 0.003)
- Steel moment frames experience minor local yielding at few locations. No buckling, fracture, and observable distortion of members.
- Lastly, braces of Braced steel frame structure suffer minor yielding or distortion

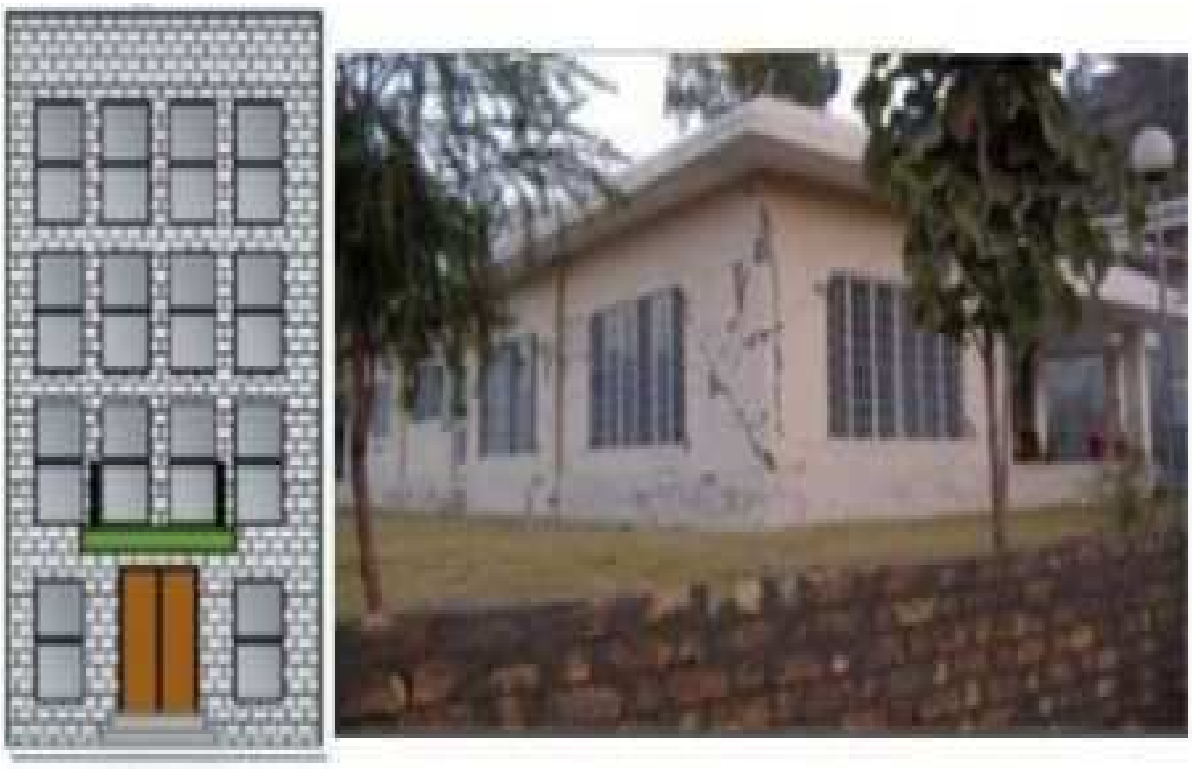


Fig 1. 6Life Safety (LS) Performance Level

Life safety performance level

- This level intended to obtain a damage condition that presents a substantially low probability of danger to life safety. Whether the danger is due to structure damage or fallen of nonstructural components of a building.
- The building experiences moderate overall damage
- All stories of a structure retain some residual strength and stiffness left in.
- Gravity-load bearing elements function.
- There will be no out of plane failure of walls or tipping of parapets.
- However, the structure undergoes some permanent drift.
- Partitions suffer damage.
- Building may be beyond economical repair.
- Falling hazards mitigated but many architectural, mechanical, and electrical systems are damaged.
- Concrete frame beams damage extensively, shear cracking and cover spall off occur in ductile columns, and minor cracking develops in no ductile columns.
- Hinges create in steel moment frames. In addition to local buckling of some beams, serious joint distortion, and fracture of isolated moment connection. However, shear connection would remain sound and few elements might suffer partial fracture.
- Lastly, in braced frames, majority of bracing buckle or yield but do not fail entirely, and several connections may fail as well.



Fig 1. 7Collapse Prevention (CP) Performance Level

Collapse prevention performance level

- This level of building performance mainly relates to the vertical load carrying system and the structure need to stable under vertical loads only.
- Generally, the building damage is severe
- The structure retains little residual stiffness and strength.
- However, load bearing columns and walls function.
- The building suffers large permanent drifts.
- Some exits blocked.
- Infill and un-braced parapets failed or at incipient failure.
- Building is near collapse.
- Nonstructural components damage extensively.
- In concrete frames, hinges and extensive cracking develop in ductile elements, no ductile columns experience splice failure and limited cracking, and short columns damage seriously.
- Beams and columns distort heavily in steel frames. Added to that, several moment connections fracture but shear connections remain intact.
- Finally, braces yield and buckle extensively in braced frames, and even many of them along with their connections could fail.

Performance point (PP): Indicates the damage state for which building is to be designed. The displacement at (pp) is the target displacement (Δt) also called design displacement (Δd). To know the performance of the building we need to know the performance point.

- **If$\Delta pp<\Delta IO$, it implies IO building.**
- **$\Delta pp>\Delta IO\&<\Delta LS$, LS building.**
- **$\Delta pp>\Delta LS\&<\Delta CP$, CP building**

Performance Levels

The selection of performance criteria acceptable to all the concerned parties is essential. Three performance levels are now under consideration as recommended by FEMA (2000a) for the seismic risk evaluation of steel structures. They are collapse prevention (CP), life safety, and immediate occupancy (IO) of a structure. Collapse prevention represents a performance level of serious structural damage that may lead to collapse. Obviously, a structure wills Performance Levels The selection of performance criteria acceptable to all the concerned parties is essential. Three performance levels are now under consideration as recommended by FEMA (2000a) for the seismic risk evaluation of steel structures. They are collapse prevention (CP), life safety, and immediate occupancy (IO) of a structure. Collapse prevention represents a performance level of serious structural damage that may lead to collapse. Obviously, a structure will

Table 1. 2Structural Correlation of Performance Levels, Probability of Exceedance Return Period and Allowable Drift

Performance level	Probability of exceedance	Earthquake return period	Allowable drift (δallow)
CP	2% in 50 years	2,475-year	0.050 *H
LS	10% in 50 years	475-year	0.025*H
IO	50% in 50 years	72-year	0.007*H

be unusable at this damage level. Life safety is a state of considerable structural damage; some structural members may fail, and the structure must be repaired before reoccupancy. The IO performance level is characterized by a practically undamaged structure, so the structure can be used immediately. FEMA (2000a) proposed the performance levels of CP, LS, and IO in terms of the probability of exceedance, earthquake return period, and allowable overall lateral and/or interstory drifts (Table1.2). The term H in the Table 1 represents the total and story height of the building to consider the overall and interstory drift, respectively, for the

two LSFs. This study uses the allowable drift values in Table1.2 to document the implementation of PBSD.

1.8 OBJECTIVES

1 To formulate FEM model for frame analysis.
2 To perform performance based seismic design (PBSD) of steel frames
3 To obtain preliminary results for frame analysis to get performance parameter.

CHAPTER 2
LITERATURE REVIEW

2.1 GENERAL

In this chapter it would be difficult to include a comprehensive analysis of the literature relating to the modelling of systems in their entirety. This segment is a short summary of previous research on applying the PBSD study specially pushover analysis of steel frames. This study of the literature focuses on recent contributions relating to pushover analysis of steel frames and previous activities most closely linked to the needs of the present research.

Camacho, et. al. [1] developed afinite element FE model to analyze the behavior of steel frames by performance based seismic design using rigidities of connections. For the information on reliability, risk or the probability of failure in steel structure Monte Carlo simulations are used. For the implications of rigidity of PR connections in steel buildings stress based FE algorithm is formulated. The accuracy and efficiency of model is analyzed by taking three examples of steel frame. First verification is done on two storey frame. The robustness and implementation potential of the PBSD approach were demonstrated with the help of 9 story and 20 story steel frame. They evaluated reliabilities of steel frame structure for the overall and interstory drift.The performance criterions were successfully verified by PBSD which made believes that post-Northridge design requirement increase the possibility of achieving more-resilient and damage tolerant steel structure.

Papadopoulos, et. al. [2] analyzed vulnerability objectives of structure by performance based seismic design (PBSD). From the test cases examined it was observed that although PBD with vulnerability constraints is up to 10% more expensive compared to the standard PBD designs in case of initial cost, it is 20-25% cheaper with reference to the life cycle cost. By targeting limit state probabilities of exceedance vulnerability objectives are introduced. This is achieved by performing additional probabilistic design check. A structural optimization problem is considered in order to assess the designs obtained using the proposed approach with respect to standard PBSD procedure with deterministic constraints. For the optimum design of 3D RC building two procedures have been applied. It has been demonstrated that the concept of PBD using vulnerability constraint can be easily integrated into a structural optimum design that fulfill the provision of modern framework for seismic design of structures.

El-Zanaty, et. al. [3] analyzed the nonlinearity of steel frames by finite element methods (FEM). In these nonlinear methods of framed analysis based on large deformation theories, applicable to both elastic and inelastic solutions of plane frame problems were presented. In the inelastic formulation, the effect of axial loads on the stiffness of the structure is considered.The effect of axial loads on the stiffness of the structure is considered.The theory is based on the simple geometric approximationwhichpermits the virtual work equations to be derived in a manner consistent with the full nonlinear strain displacement equations without introducing further approximations.When this geometrically nonlinear theory is combined with Shanley's tangent modulus concept (15), and the incremental Newton-Raphson equations are formed by the finite element method, a numerical

technique emerges which is capable of solving inelastic frame stability problems for planar frames of arbitrary geometry.

Salajegheh, et. al [4] has presented a performance based design of steel frames.Analytical researches on the proposed beam to column connections have proved that this connection can be assumed rigid. This research describes the type of rigid beam to column connection and discussed its moment curvature behavior obtained from finite element analysis using ABAQUS software. Estimation of acceptance criteria required for performance based seismic design of such frames by using nonlinear static analyses results were developed.Ant Colony Optimization (ACO) theory was employed to accomplish the performance based design process, utilizing a MATLAB program for optimization and OpenSEES (Open System for Earthquake Engineering Simulation) software capabilities in structural analysis.

Mehrabian, et. al. [5] has presented a nonlinear analysis of steel frames. Northridge earthquake in 1994 caused a catastrophic damage to the steel structure which is constructed by an earthquake resisting building design criterion. The beam column connection was PR type which caused the nonlinearity in structure. In this, a case study of analytical investigation of nonlinear seismic performance of a 9-story steel frame was presented. Fourparameter Richard model, a mathematical model was proposed first to represent moment–relative rotation (M–θ) curves fora proprietarysteelconnection.Themodelispresentedand described was elsewhere (4)andcangenerate(M–θ)curvesfor otherbeam–columnassemblies. Bolted-web, welded-flange connections withadequateductility (BWWF-AD) connections used in this study have large elastic stiffness, ductility, and energy absorption capacity in comparison with other types of PR connections.Whengroundshakingwassignificantenough toproducelargelateraldisplacements, thepresenceofBWWF-ADconnectionsimprovedtheresponsesoftheframes.

Reyes-Salazar, et. al. [6] analyzed nonlinear seismic response of steel structures with semi-rigid and composite connections.Steel frames are usually analyzed assuming all the connections are fully restrained, but experiments suggests that its rarely true.This practice introduces unintended flexibility in the frame which causes the damage to structure during earthquake.For these studies, nonlinear time domain seismic analysis algorithm developed, three steel frames are excited by 13 earthquake time histories. Twelve of them were recorded during the Northridge earthquake of 1994.One of these 12 earthquake time histories can be used to represent the Northridge earthquake in future designs.The nonlinear seismic responses of steel frames with fully restrained, partially restrained and composite connections are evaluated and compared in terms of the maximum interstory and maximum top lateral displacements.To define the rigidity of a connection, a parameter called the T ratio is introduced. Initially, the T ratio of all the connections is assumed to be 0.9, making them fully restrained. The results indicate that this assumption is inappropriate and gives unconservative responses in most cases.Further parametric study indicates that, at least for seismic analysis, PR or composite connections should be designed for a T ratio as close to 1 as possible to represent an FR connection. Otherwise, the lateral displacement failure criterion should also be checked for less than ideal FR connection conditions.

Foley CM. [7] a review of current state-of-the-art seismic performance-based design procedures and provided the vision for PBD optimization development. It is acknowledged that the development of optimized PBD procedures for seismic structure engineering is urgently needed.

R. Hasan, et. al. [8] conducted a simple computer-based push-over analysis technique for performance-based design of earthquake-loadable building frameworks. And found that for push-over analysis, rigidity-factor for elastic analysis of semi-rigid frames and the stiffness properties for semi-rigid analysis are taken directly.

B. AKBAS,et. al. [9] conducted a push over analysis on steel frames to estimate the seismic demands at different performance levels, which requires the consideration of inelastic behavior of the structure.

X.-K. Zou et al., [10] presented a successful technique combining Pushover Analysis and numerical optimization techniques to automate the Pushover drift output design of reinforced concrete structures. PBD using nonlinear pushover analysis, which typically requires repetitive computational effort, is a highly iterative method required to fulfill the requirements of code.

Oğuz, et. al. [11] Used in pushover analysis to predict the action imposed on the structure due to randomly chosen individual ground motions causing elastic deformation by observing different rates of nonlinear response. Of this reason, pushover analyzes were performed on reinforced concrete and steel moment resistant frames covering a wide range of fundamental periods using various invariant lateral load patterns and Modal Pushover Analysis. On frame structures, the precision of estimated Procedures used to estimate target displacement was also studied. DRAIN-2DX and SAP2000 rendered pushover analyzes.Pushover analyses were performed by both DRAIN-2DX and SAP2000. The primary observations from the study showed that the accuracy of the pushover results depended strongly on the load path, the characteristics of the ground motion and the properties of the structure.

Mehmet et al., [12] Explained that the structural engineering profession was using a nonlinear static method or pushover analysis because of the simplicity of Push over Analysis. Pushover research is performed on the basis of the FEMA-356 and ATC-40 guidelines for various nonlinear hinge properties present in some programs and he pointed out that plastic hinge length (Lp) has significant effects on the frame's displacement capability. The default-hinge properties (Program Default) cannot take proper account of the orientation and axial load level of the columns.

Shuraim et al., [13] In order to test its applicability, the non-linear static analytical technique (Pushover) implemented by ATC-40 was used to analyze the current configuration of a building. He performed nonlinear pushover analysis shows that the frame is capable of withstanding the pre-assumed seismic force at all beams and columns, with some important yield.

Girgin. et al., [14] pushover analysis has been the preferred approach by the major rehabilitation guidelines and codes for seismic performance assessment of structures because it is computationally and conceptually simple. Pushover analysis enables the sequence of yield and failure to be tracked at member and structural level, as well as the development of the structure's overall capability curve.

A. Shuraim et al., [15] the non-linear static analytical technique (Pushover) introduced by ATC-40 was used to test the current reinforced concrete frame configuration. The pushover approaches estimated possible structural defects in the reinforced concrete frame when exposed to a mild seismic loading. In this method the design was evaluated by redesigning under selected seismic combination to show which members would require more strengthening. Most columns needed substantial additional strengthening, suggesting their weakness when experiencing seismic forces.

Athanassiadou [16] Two ten-storied two-dimensional plane stepped frames and one ten-storeyed standard frame built for high and medium ductility classes according to Euro code 8 (2004) were analyzed. This work validates the design methodology for irregular buildings which requires linear dynamic analysis recommended in Euro code 8. The stepped buildings, designed according to Euro code 8 (2004), were found to behave satisfactorily under the earthquake design basis and even under the maximum considered earthquake (involving ground motion twice as powerful as the earthquake design basis). In the case of the "collapse protection" earthquake, inter-storey drift ratios of irregular frames were found to remain very small.This reality, combined with the restricted structure of plastic hinge in columns, excludes the possibility of creating a collapse mechanism in the irregularities neighborhood. During the design basis earthquake, plastic hinge formation in columns is seen to be very minimal, occurring only at locations not prohibited by the code, i.e. at the base and top of the structure. It was concluded that the capacity design procedure given by Euro code 8 is fully effective and can be characterized by conservatism, especially in the case of the design of columns with high ductility.The over-strength of the abnormal frames is close to that of the normal frames, with the over-strength ratio values for medium – high ductility ranges being 1.50 to 2.00. The author reported pushover analysis findings using "uniform" load pattern as well as a "modal" load pattern that accounts for multimodal elastic analysis findings.

A.Kadid and A. Boumrkik [17] proposed use of Pushover Analysis as a viable method for assessing the vulnerability of an Algerian-designed building to damage. The Pushover analysis was a series of incremental static analyzes performed to develop a building capacity curve. A target displacement was calculated based on capacity curve which was an estimation of the displacement that the earthquake design would generate on the building. The structure encountered at this target displacement is considered to be indicative of the damage sustained by the building while experiencing ground shaking design phase.Since the behavior of reinforced concrete structures under seismic loads could be highly inelastic, plastic yielding effects would dominate the global inelastic performance of RC structures and consequently the accuracy of the pushover analysis would be influenced by the capability of the Analytical models to capture these effects.

P.Poluraju and P.V.S.N.Rao [18] by conducting Push over Analysis, the behavior of framed buildings was studied, most of the buildings collapsed were found to be deficient in meeting the requirements of the current codes. Then G+3 building was modeled and analyzed, the results obtained from the study show that under seismic loads the properly designed frame will perform well.

NarenderBodige, Pradeep Kumar Ramancharla [19] modeled a 4-story building with 1 x 1 bay 2D using AEM (Applied Element method). AEM is a discrete system in which the elements are bound by pairs of normal and shear springs that are distributed along the edges of the elements and each pair of springs completely represents stresses and automatically shapes deformation and position of plastic hinges. Gravity and lateral loads were added to the structure as per IS 1893-2002 and constructed using IS 456 and IS 13920. In both cases, the displacement control pushover analysis

was performed, and the pushover curves were compared. It was found as an observation that AEM gave good curve of capacity for representation.From the case studies it was found that when ductile detailing was adopted, the building capacity significantly increased. Effect on concrete grade and steel was also found not to be highly significant.

2.2 LIMITATIONS OF EXISTING STUDIES

Many researchers have performed many experimental and theoretical works in the area of the pushover study of the steel frames. Nowadays the idea of pushover analysis is increasing rapidly.

This work is about the steel frame pushover study. In previous research, the applications of pushover analysis of the steel frames were extensively studied. However, several researchers conducted on the pushover analysis experimentally and analytically but the study of pushover analysis is done with minimal work.

2.3 CLOSURE

The literature review has suggested that use of a pushover analysis of the steel frame is feasible. So it has been decided to use STAAD Pro Advanced for the modeling and analysis. With the help of this software study of steel frame has been done.

CHAPTER 3

METHODOLOGY

3.1 MODELING METHODOLOGY:

3.1.1 INTRODUCTION

The structural system is modeled as:

1. **2D Moment Resisting Frame**
2. **3D Concentric Braced Frames**
   a. **Steel Frame Without Bracing**
   b. **Steel Frame with External Bracing**
   c. **Steel Frame with Optimum Bracing**

All above frames are analyzed by Nonlinear Pushover Analysis.The FEM based structural software used for modeling and analysis of the steel frame is STAAD Pro. Advanced software package.

3.1.2 MODELLING

The basic approach for using the program is very straightforward. The user establishes grid lines or can directly create frame from structural wizards,defines material, type of support and section properties graphical user interface. All the types of loads that the structure is subjected to, can bedefined and assigned to the appropriate structural components. Nonlinear Pushover Analysis properties like gravity loads, convergence criteria for geometric nonlinearity, spectral parameters like critical damping and mapped spectral acceleration, hinge properties (FEMA) can be defined. Finally, the nonlinear static analysiscan be performed and the results are generated in graphical or tabular form that can be printed toa printer or to a file for use in other programs. The following topics describe some of theimportant areas in the modeling.

3.1.3BASICSTEPSIN STAAD PROADVANCEDWHILEPERFORMINGPUSHOVERANALYSIS

1) **Structure Wizard:** Used to parametrically generate a structural model and then transfer and superimpose it on the current structure in STAAD.Pro. Opens when Geometry > Run Structure Wizard is selected in the STAAD.Pro window.

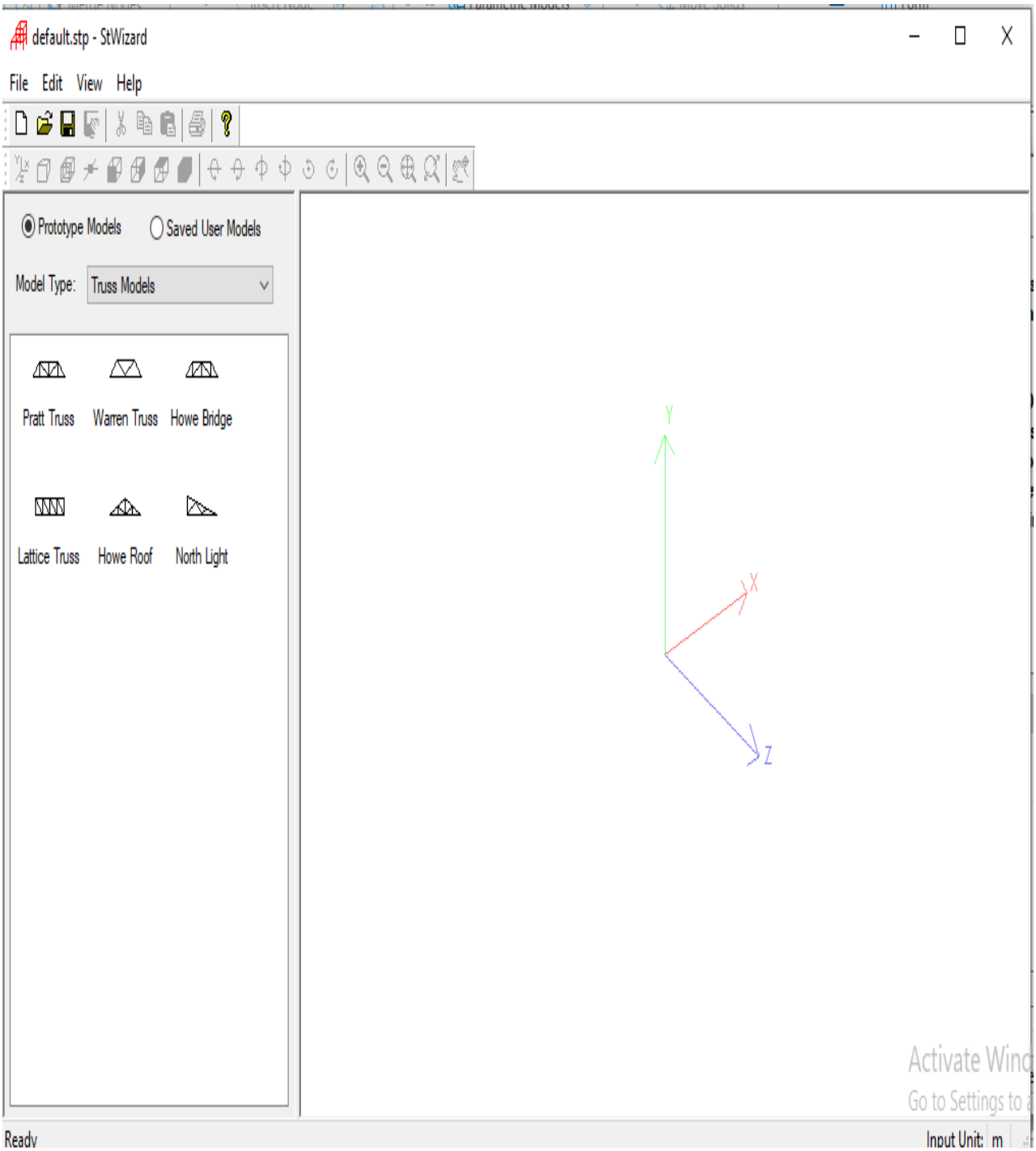


Fig 3. 1Structure Wizard Window

The Prototype Modelsshown in fig.3.1and Saved User Models options appear on the top of the left side of the screen. If the Prototype Models option is selected, the Model Type will list the types of prototype structures available (such as Trusses, Frames, Plates, Solids, etc.) as shown below. If the Saved User Models option is selected, the Model Type will display the list previously done and saved models by the user. As steel frame need to be created, portal frame option is selected

After that prototype model window will displays different types of frame models such as bay frame, cylindrical frame, grid frame and circular beam, etc. Here bay frame option is selected for further modeling and parameters can be given as shown below in fig 3.2

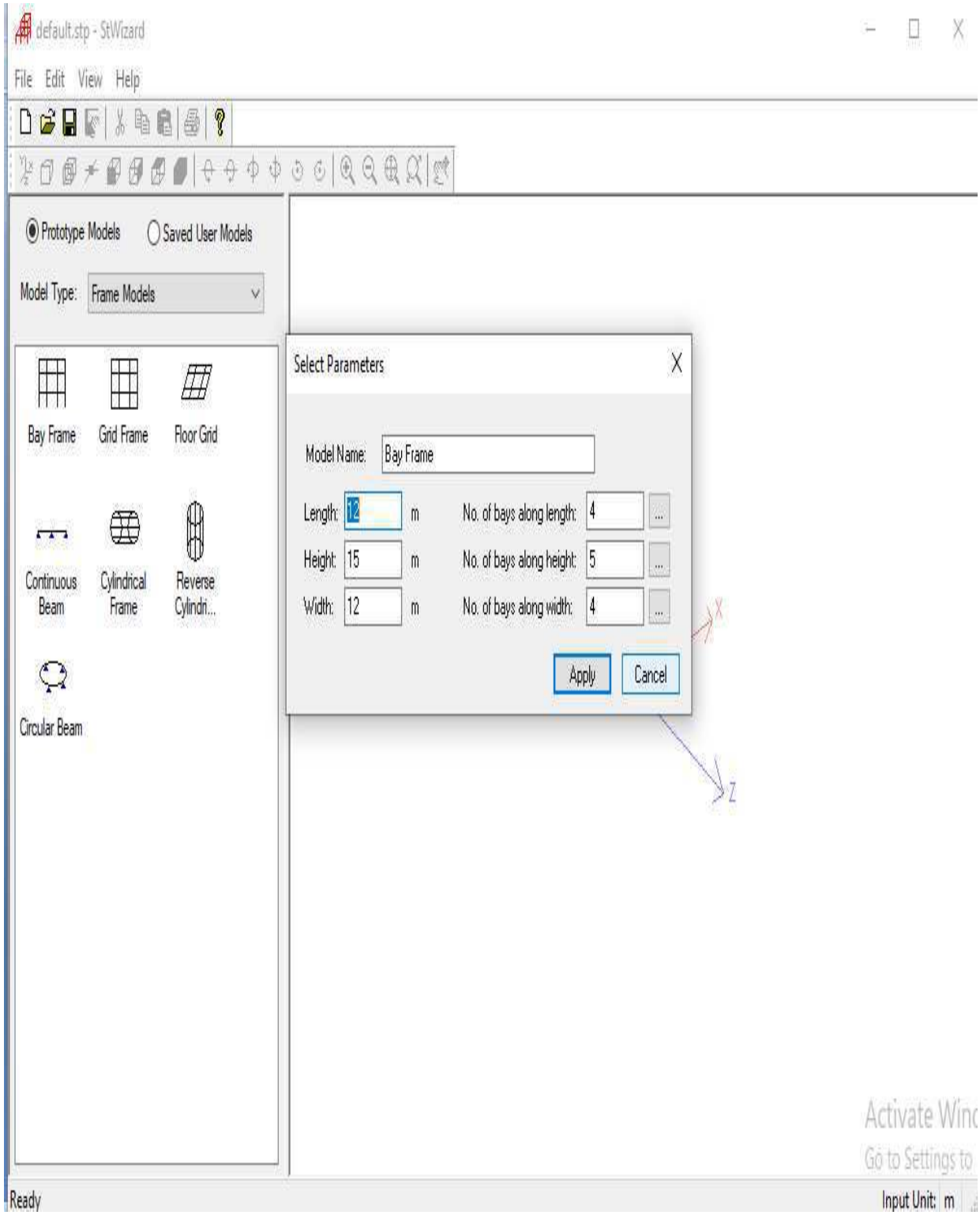


Fig 3. 2Bay Frame Parameters Window

Once the parameters are defined to the bay frame, from file tab merge model to the STAAD Pro. is selected.

2) **Specifying Member Properties:** In this procedure, cross section properties to the beam and column can be assigned. For this properties page in analytical modeling control is selected. The properties-whole structuredialogue opens as shown in fig.3.3

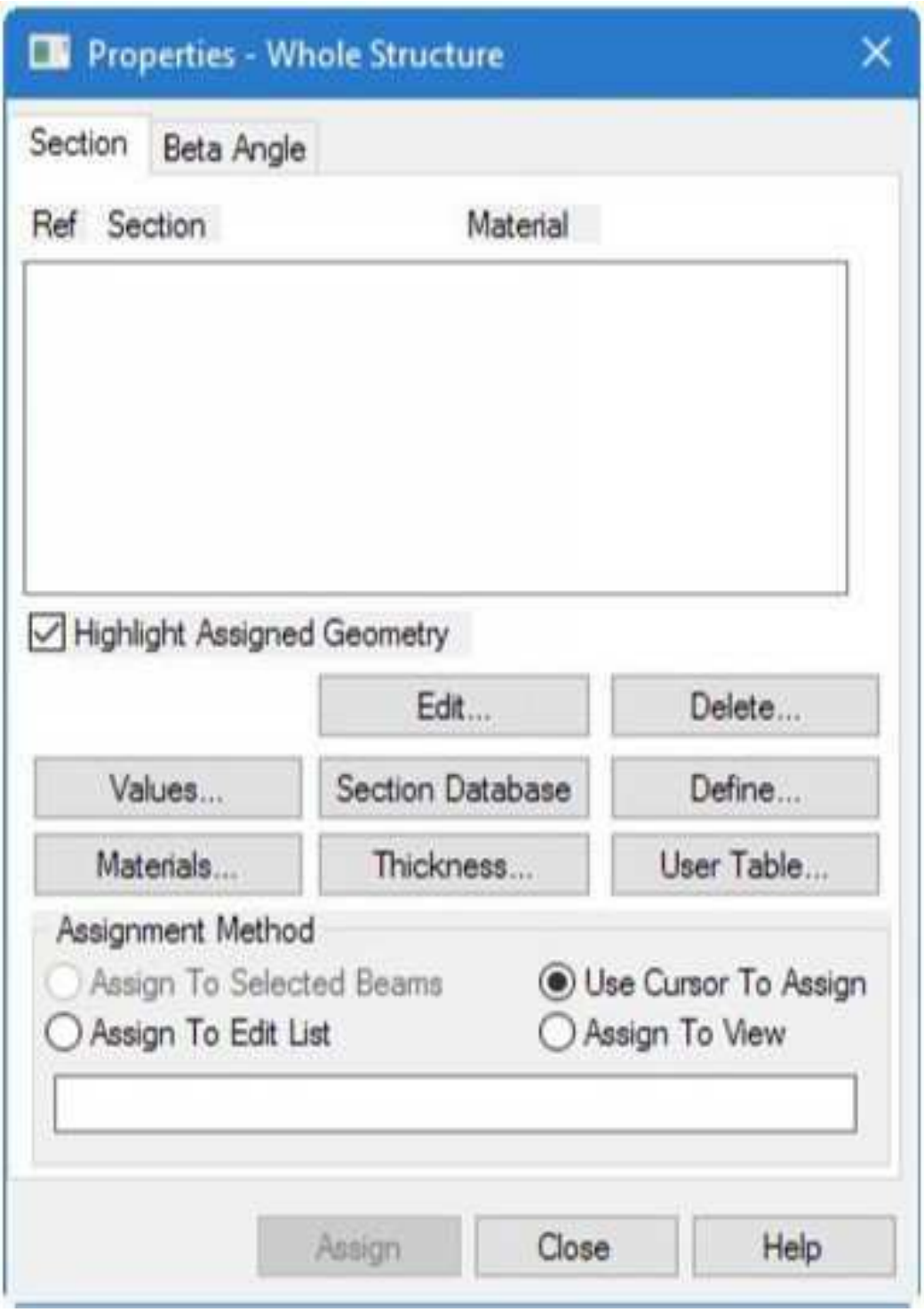


Fig 3. 3Member Properties Window

After that, Section database is clicked and Section Profile Tables dialogue box opens as shown in fig.3.4

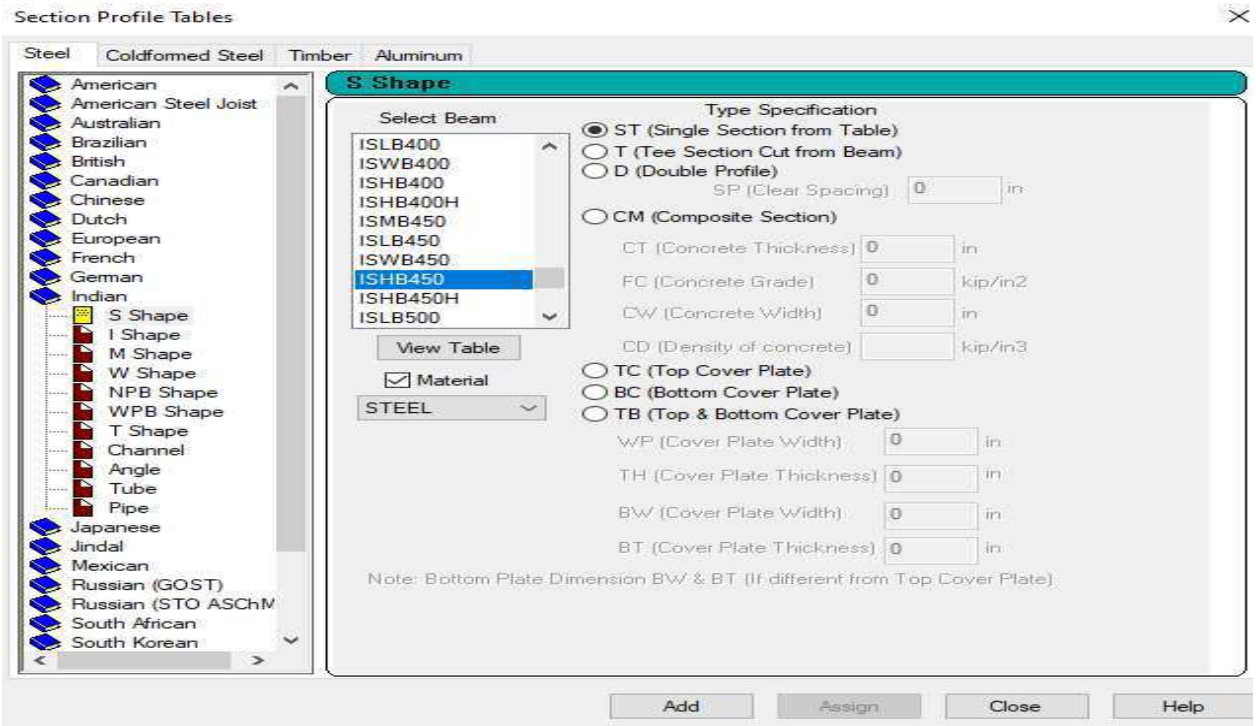


Fig 3. 4Section Profile Tables

Select the S Shape from Indian option. The property type we wish to create is S Shape from Indian Steel Table. ISHB 225 and ISHB 450 are selected as shown in below fig. 3.5

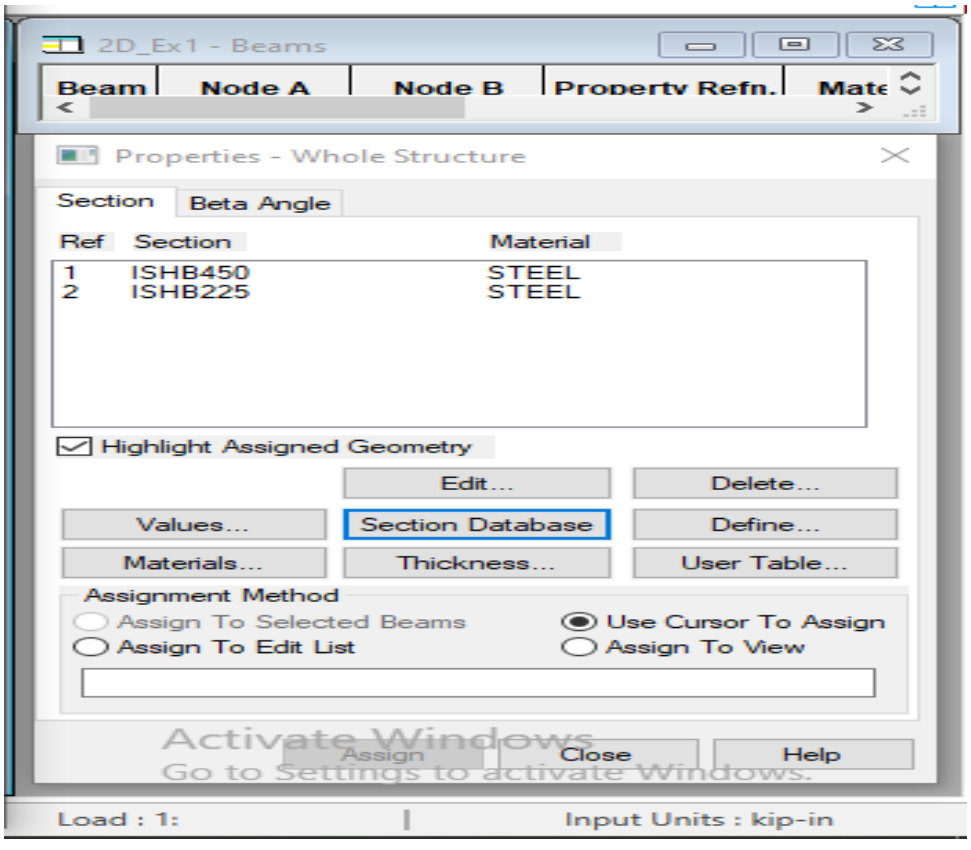


Fig 3. 5Cross Sections Window

After selecting steel cross sections from section database ISHB 450 section is assigned to the column and ISHB 225 is assigned to the beam, and for that following steps are followed.

a. Select the first property reference in the Properties dialog (ISHB450).
b. Select the Use Cursor to assign option in the Assignment Method group.
c. Click Assign.
d. Click on members 1 and 3.
e. To stop assigning properties, either:
Click Assigning
or
press the <Esc> key.
Repeat step 8 except to assign the second property reference (ISHB225) to member 2.
After the properties are assigned to the respective members, the member labels will indicate the section reference numbers as shown in fig. 3.6

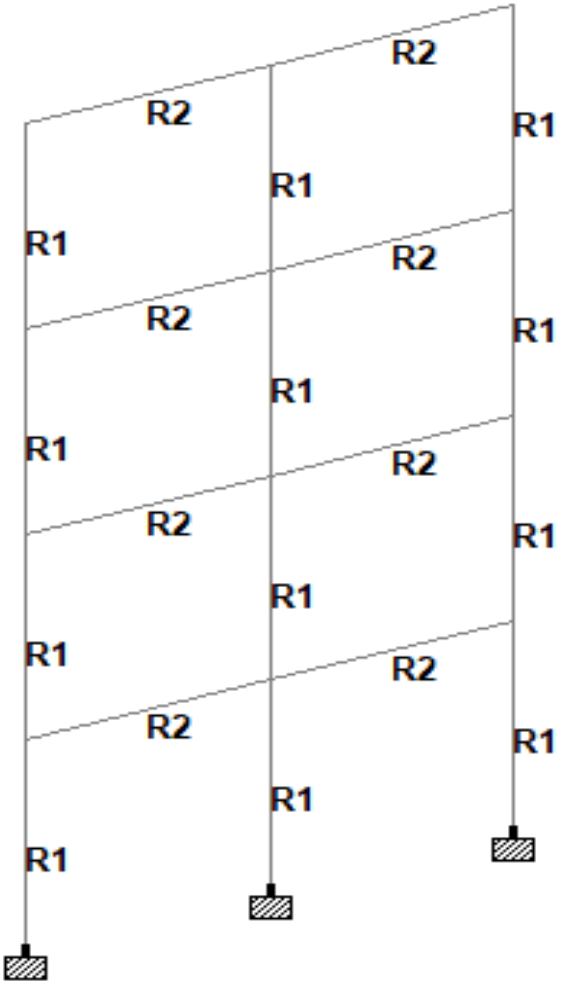


Fig 3. 6Section Property Reference no.

3) **Defining Material**: This command may be used to specify the material properties by material name. You will then assign the members and elements to this material name in the CONSTANTS command. Here the material used is steel as shown in fig. 3.7

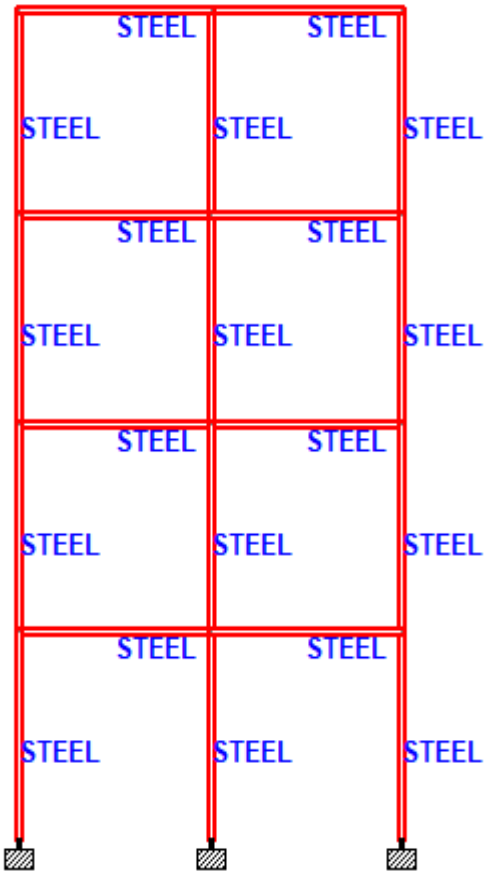


Fig 3. 7Material Properties

Table 3. 1Properties of Steel

Name	E kip/in2	Poisson's Ratio	Density kip/in3	Alpha /°F	Fy kip/in2	Fu kip/in2	Ry	Rt	Fcu kip/in2
ALUMINUM	10000.000	330E-3	98E-6	12.8E-6	0.000	0.000	0.000	0.000	0.000
CONCRETE	3150.000	170E-3	86.8E-6	5.5E-6	0.000	0.000	0.000	0.000	4.000
STAINLESSSTEEL	28000.000	300E-3	283E-6	9.9E-6	0.000	0.000	0.000	0.000	0.000
STEEL	29732.699	300E-3	283E-6	12E-6	0.000	0.000	1.000	1.000	0.000
STEEL_275_NMM2	29732.736	300E-3	283.7E-6	6.667E-6	39.885	59.465	1.500	1.200	0.000
STEEL_355_NMM2	29732.736	300E-3	283.7E-6	6.667E-6	51.488	68.168	1.500	1.200	0.000
STEEL_36_KSI	29000.000	300E-3	283E-6	6.5E-6	36.000	58.000	1.500	1.200	0.000
STEEL_50_KSI	29000.000	300E-3	283E-6	6.5E-6	50.000	62.000	1.500	1.200	0.000

4) **To assign fixed or pinned support**: To specify a node as either a fixed or pinned support, used the following procedure.

A fixed support is restrained against movement (translation and rotation) in all degrees of freedom.

A pinned support is restrained against translation only, but is otherwise free to rotate.

a. Select the nodes that will have the same supports condition.

b. On the **Specifications** ribbon tab, select one of the following tools in the supports group.

Fixed

or

Pinned

c. The Create support dialog opens to the corresponding tab

d. Either

Table 3. 2Support Dialogue

…	Do the following…
d the support type to the model and assign to the current node selection	iclick Assign.
d the support to the model for later assignment	click**Assign**.

The dialog closes.

5) **Load and Definitions:** Assigning load definitions and load cases is important part of every analysis. For this first click on loading command. The following tab of load definition will open as shown in fig.3.8

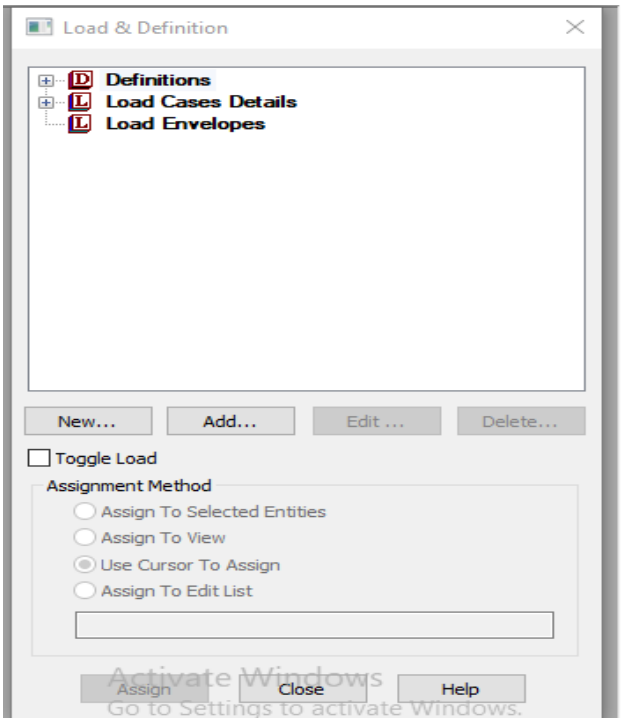


Fig 3. 8Loads and Definitions

For pushover analysis firstly we need to click on definitions then following tab will open showing various definitions as shown in fig. 3.9

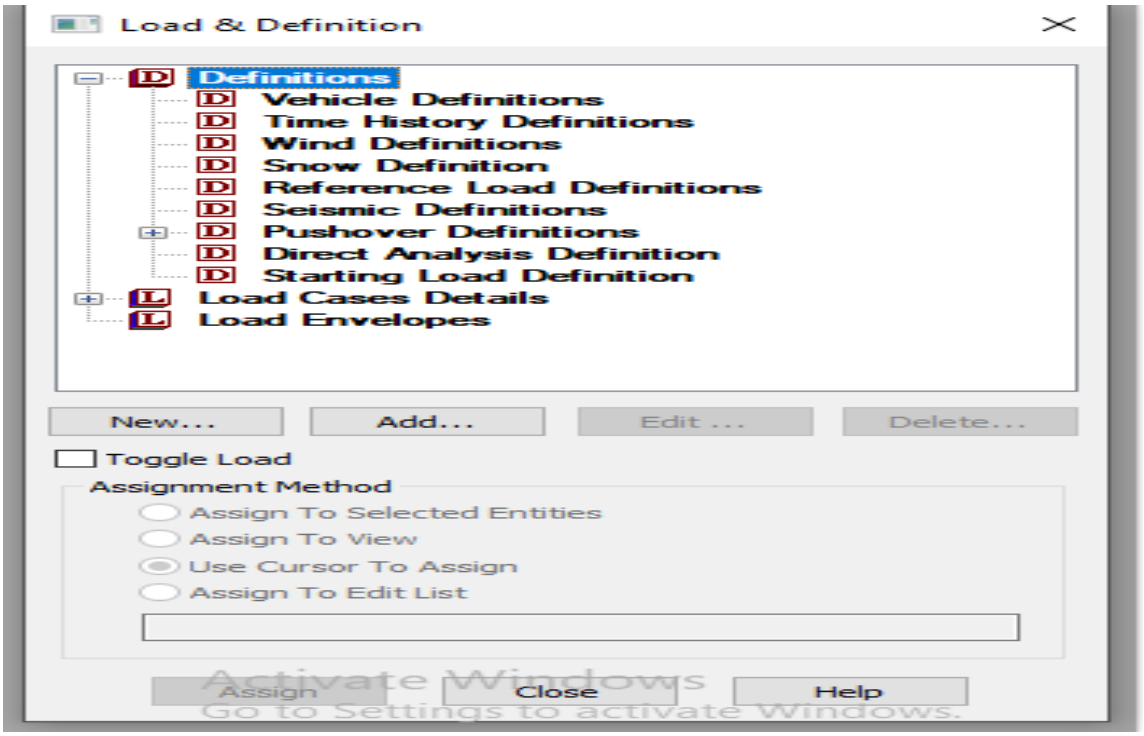


Fig 3. 9Pushover Load Definition

After selecting Pushover Definitions, click on add and following steps to be followed:

a. Define Input:

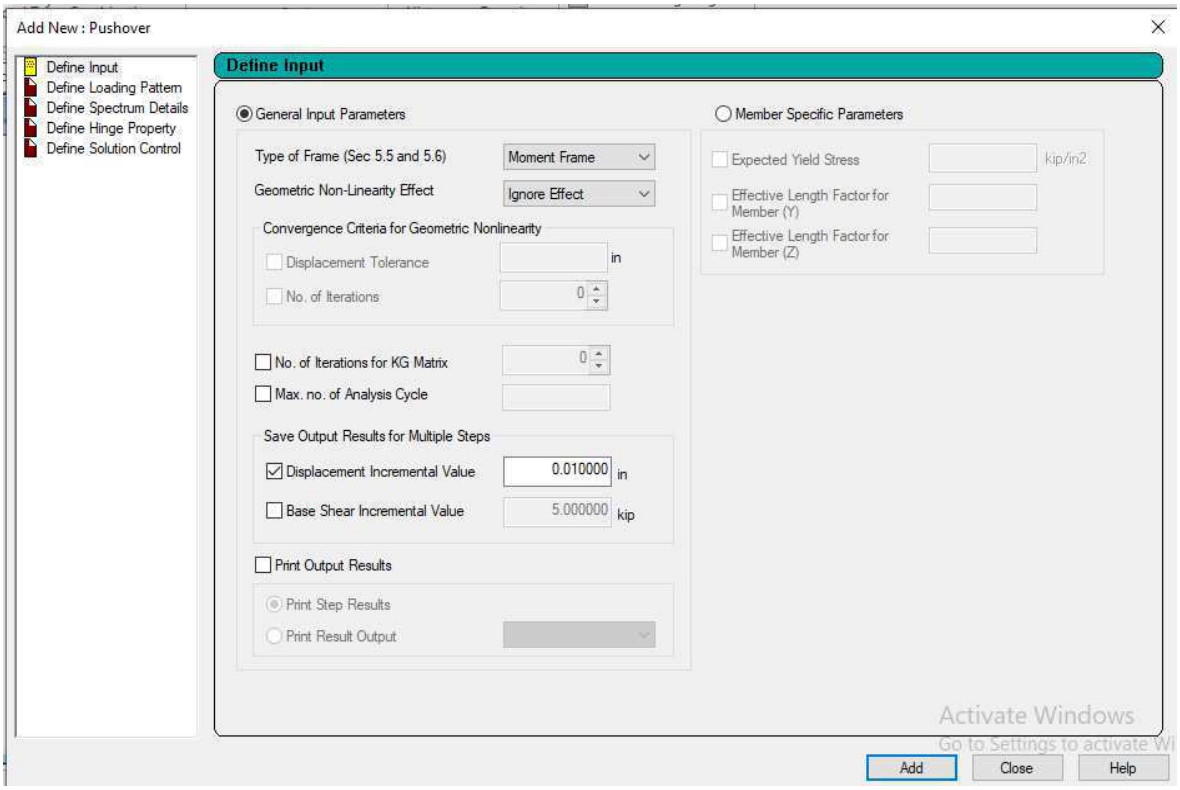


Fig 3. 10Define Pushover input

b. Defining Loading Pattern:

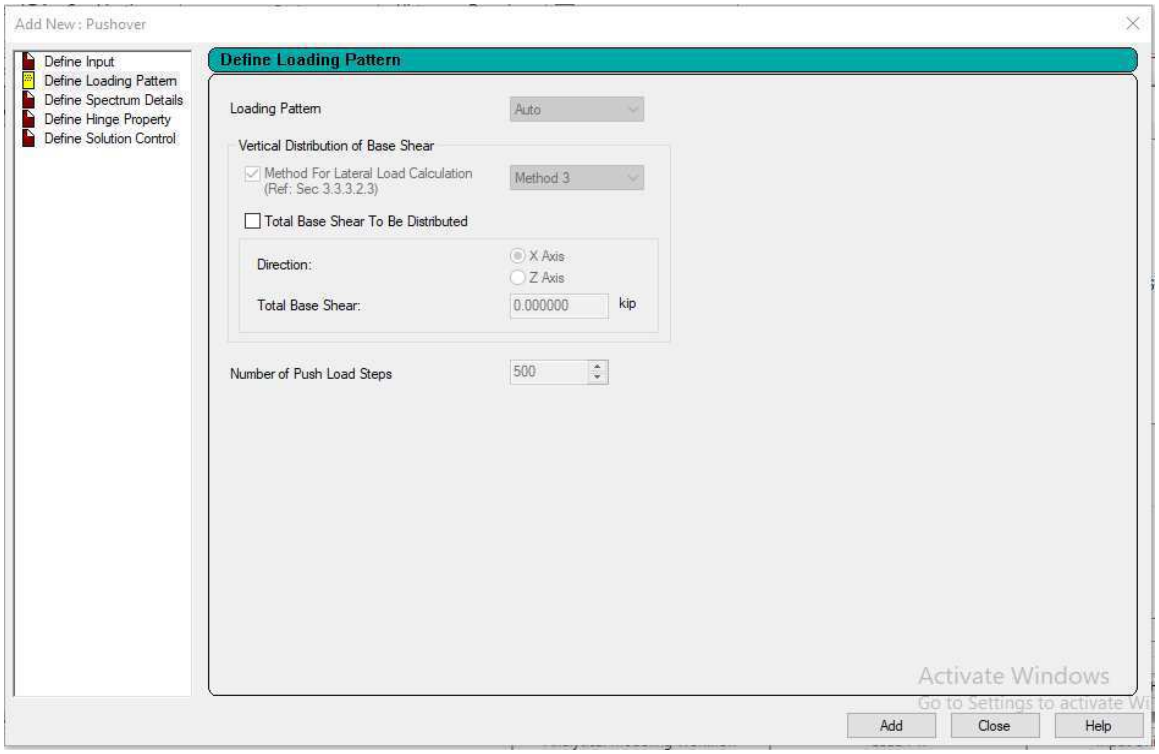


Fig 3. 11Defining Pushover Loading Pattern

c. Define Spectrum Details

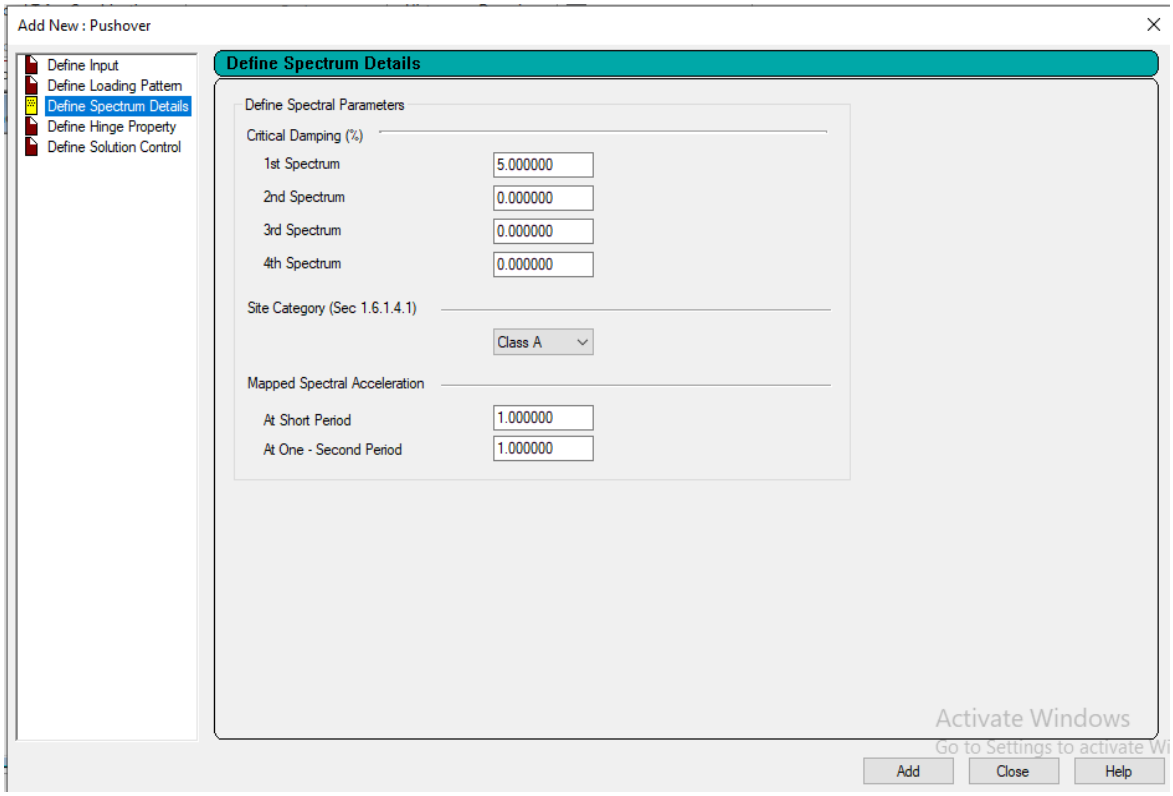


Fig 3. 12Defining Spectrum Details

d. Define Hinge Property

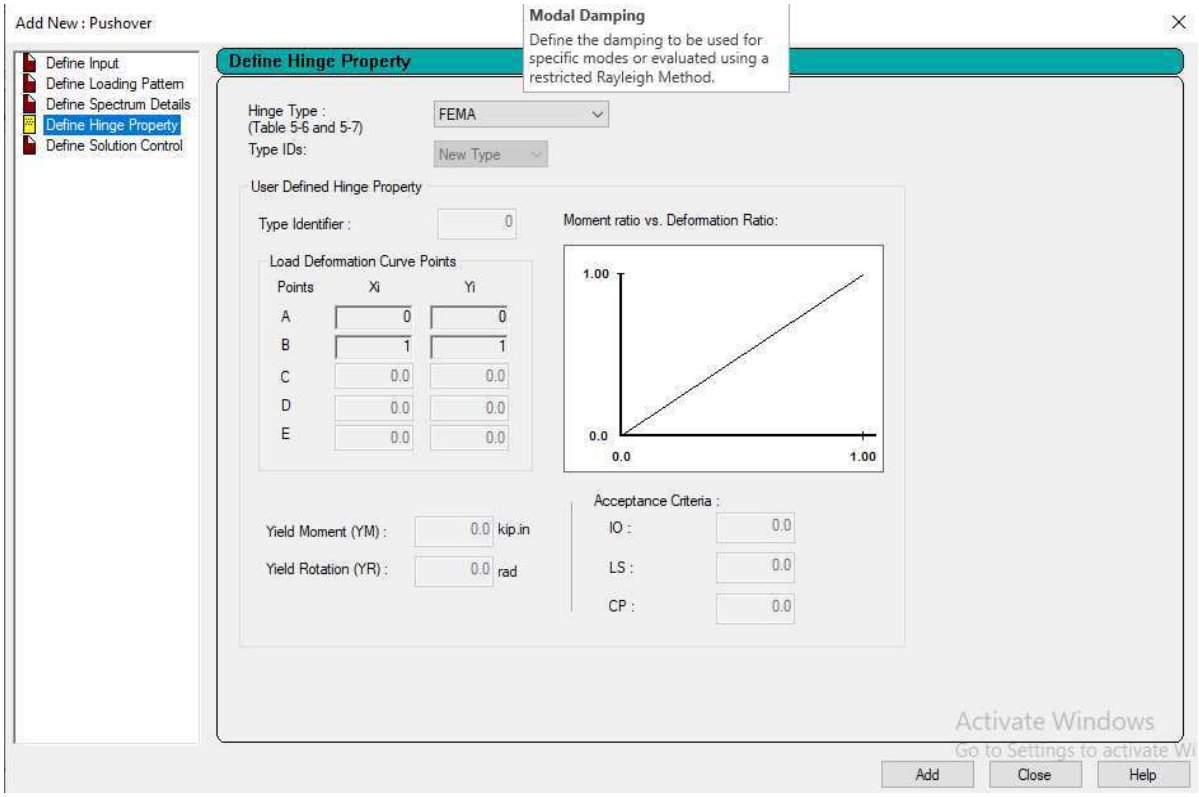


Fig 3. 13Defining Hinge Properties

e. Define Solution Control

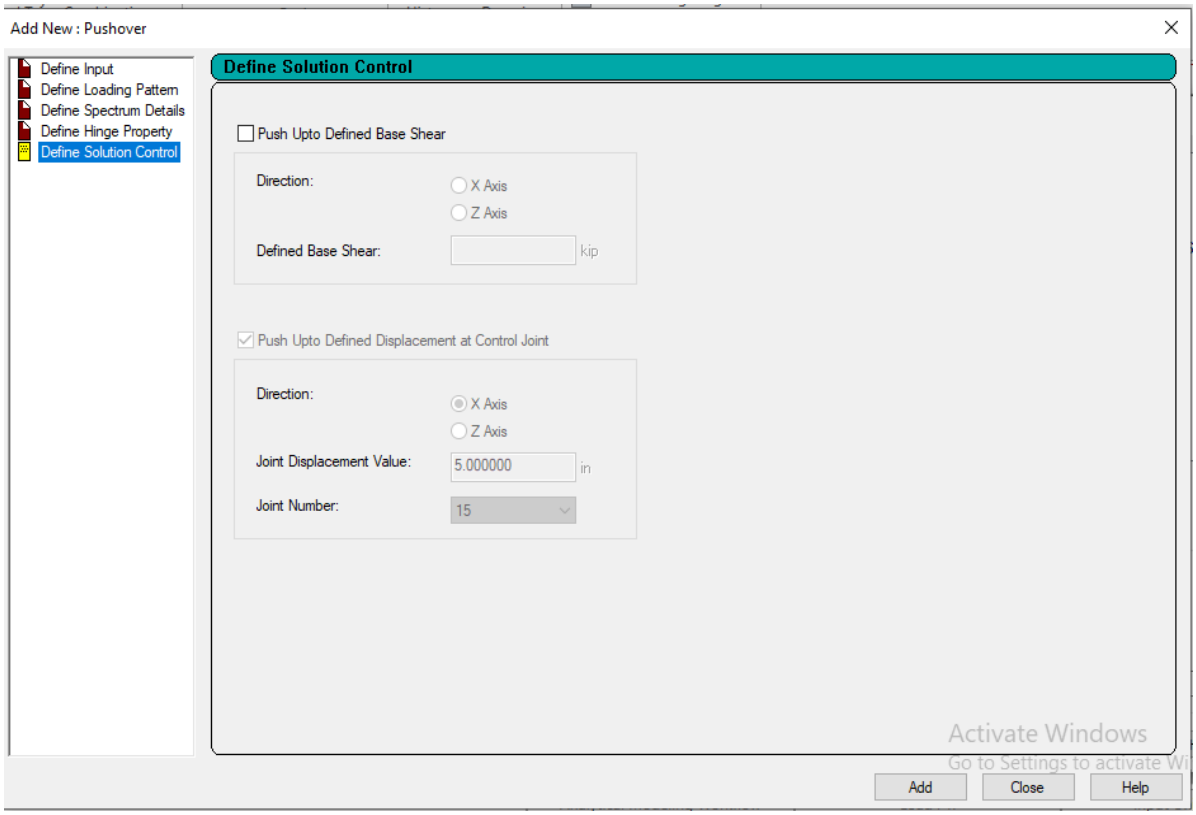


Fig 3. 14Defining Solution Control

f. Load Case Details: Under gravity Loading two load cases are defines. First one is self Wight of the steel frame as shown in fig. 18. It is assigned as -1 in global Y direction.

Second load case is of uniformly distribute load of 0.6 Kp/in in globay Y direction as shown in Fig. 22.

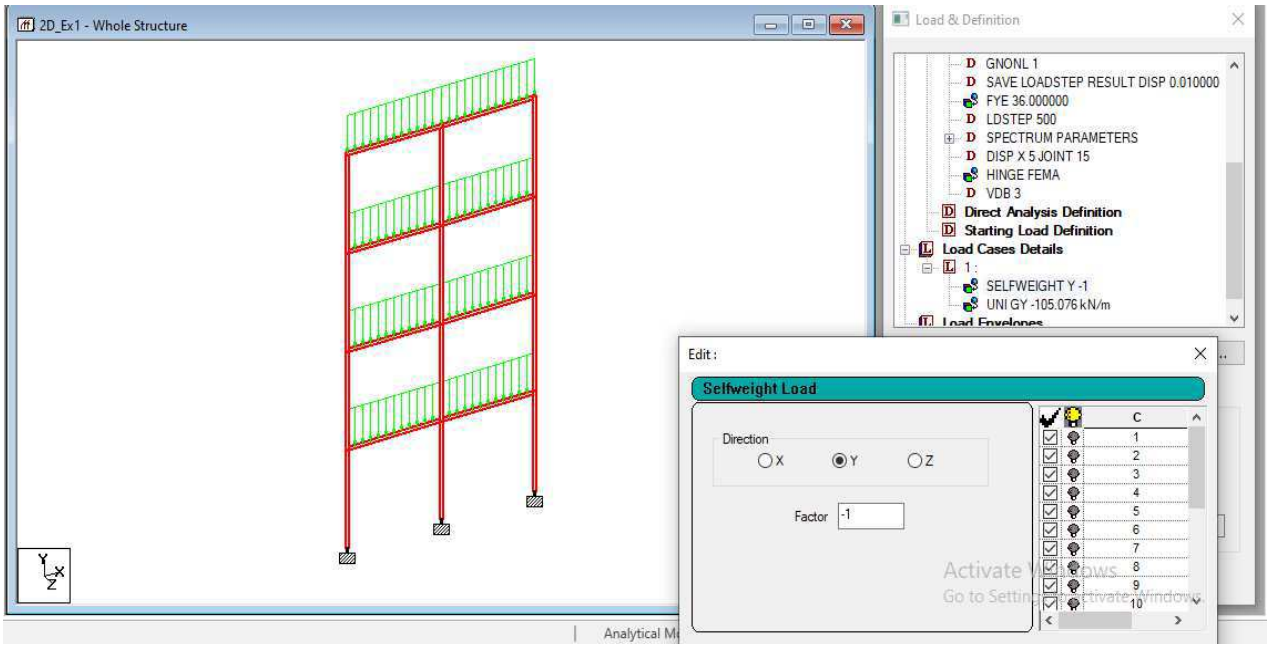


Fig 3. 15Load Case Details

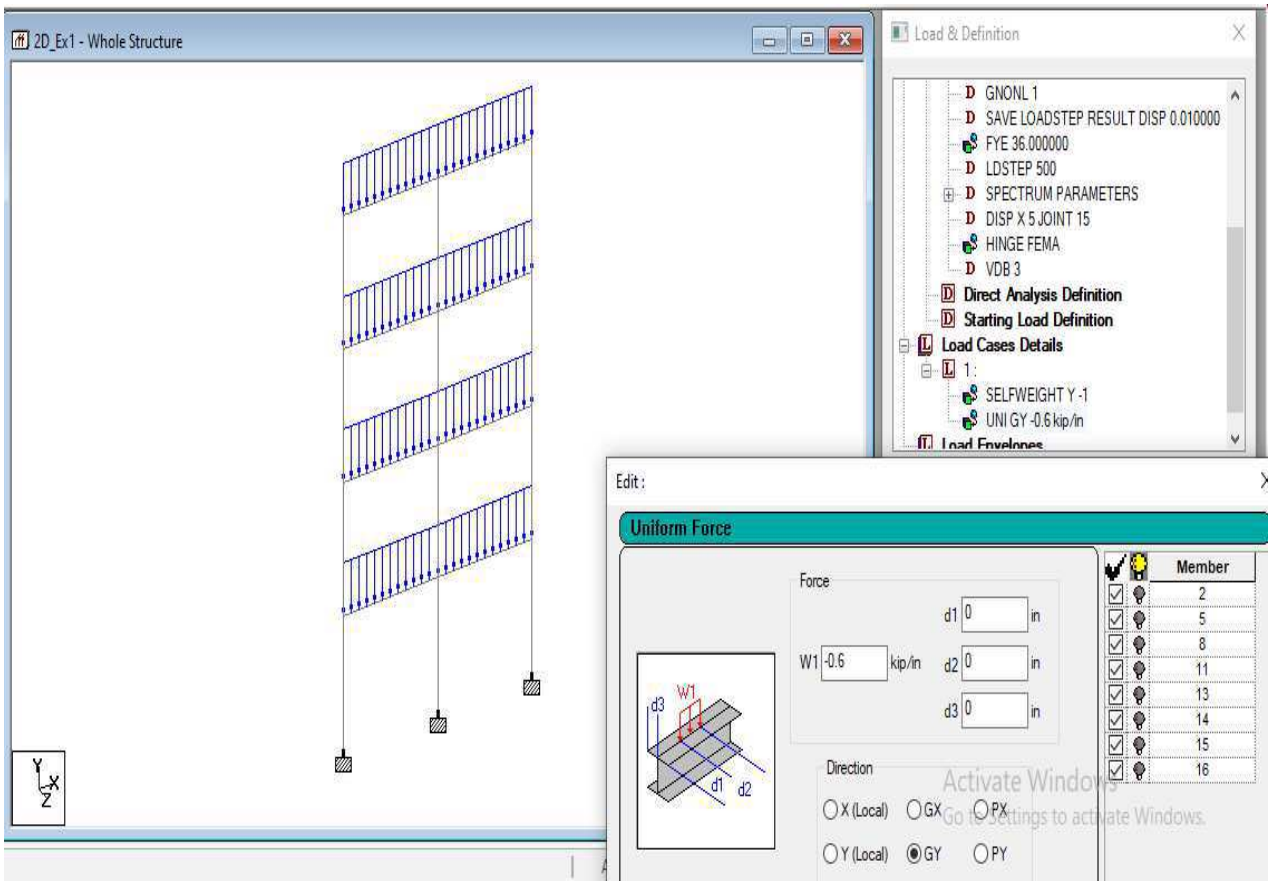


Fig 3. 16Uniformly Distributed Loads

6) **Perform Analysis:** To perform pushover analysis click on analysis > define command> click on pushover analysis> Add. These steps are supposed to follow while performing pushover analysis as shown in following Fig.3.17

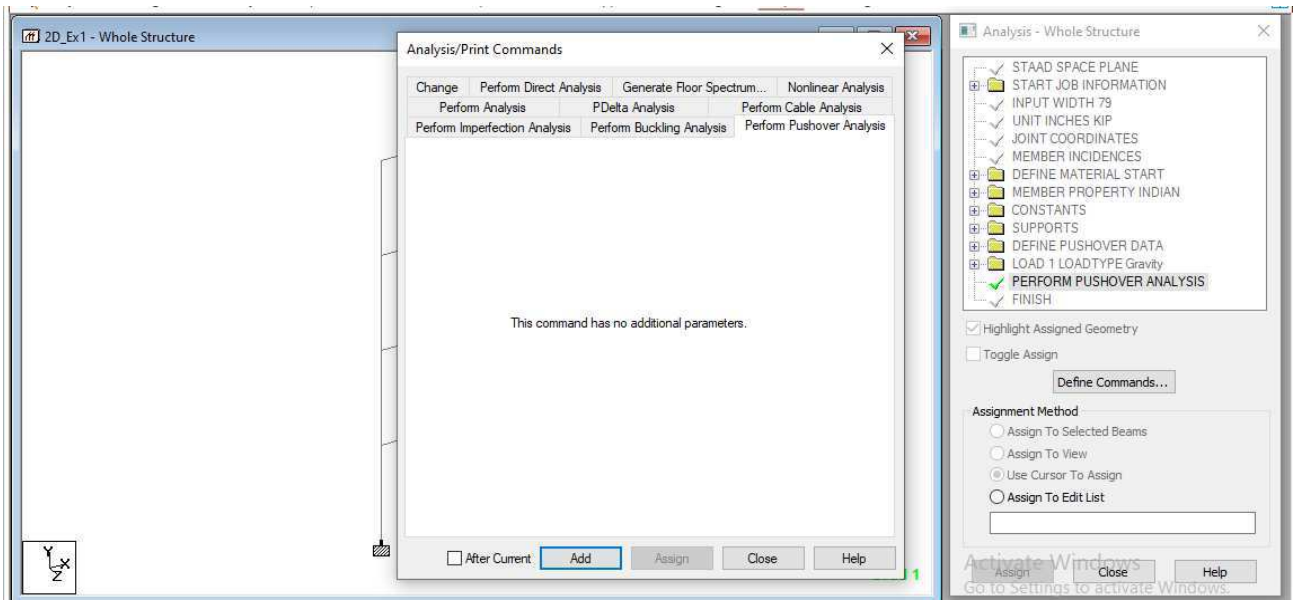


Fig 3. 17Performing Analysis

7) **Run Analysis:**Once you have completed the input file, use the following procedure to perform an analysis and optional design.

The STAAD analysis engine performs analysis and design sequentially with a single click. In order to carry out the design, these design parameters must be specified along with geometry, properties, etc. in the input file (this is referred to as a "batch" design). Also, note that you can change the design code used for design and code check before performing the analysis and design. The Analytical Modeling and Physical Modeling of the STAAD.Pro user interface are used to prepare the structural input data which is then passed to the STAAD analysis engine for general purpose structural analysis and design.

Either:

Select the Run Analysis tool in the analysis group on the analysis and design ribbon tag.

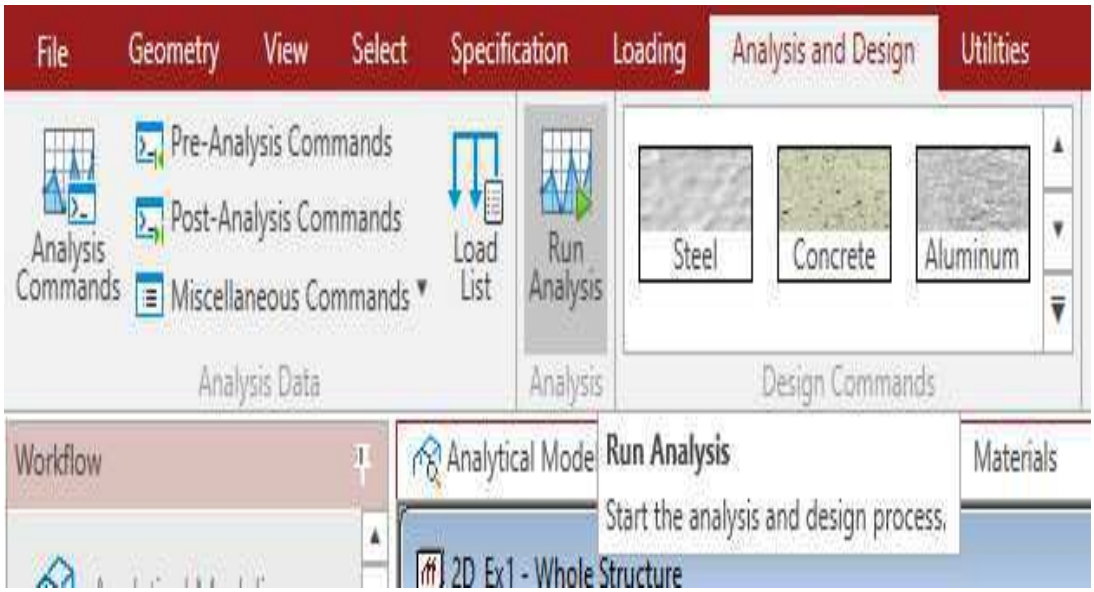


Fig 3. 18Run Analysis Tab

or

Press **<CTRL+F5>**

The STAAD analysis and Design dialog opens

During the analysis (and design, if specified), an output file is generated. This file may contain selected input data items, results and error messages. Optional print specifications can be used to include additional information in the output file.

1. Select an option for what action occurs when the dialog is closed:

   Open the output file

   or

   go to the post-processing mode

   or

   Remain in the analytical modeling mode

2. Click **Done**.
   (Optional) To review the output file is this option was not selected in the STAAD analysis and Design dialog, either:

   Select the **STAAD Output** tool in the **Utilities** group on the **Utilities** ribbon tab

   or

   Select the **View STAAD Output File** tool on the Quick Start toolbar.

Model: I > 2D Moment Resistant Steel Frame

First model considered for pushover analysis is of simple 2D, G+3 moment resistant steel frame as shown in following fig.3.19

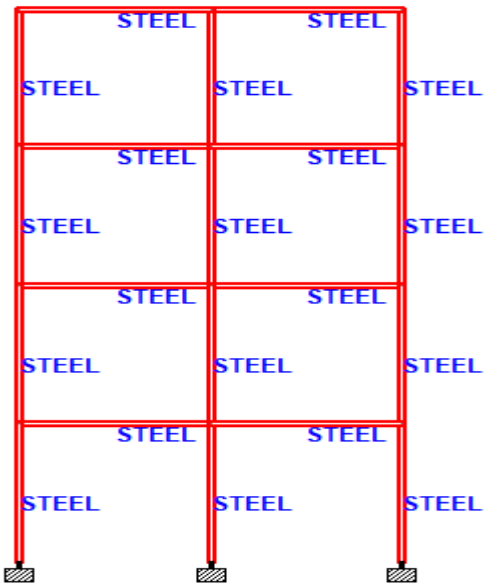


Fig 3. 192D Moment Resisting Steel Frame

Section properties of 2D moment resistant frame are as mentioned in following fig3.19and table.3.3

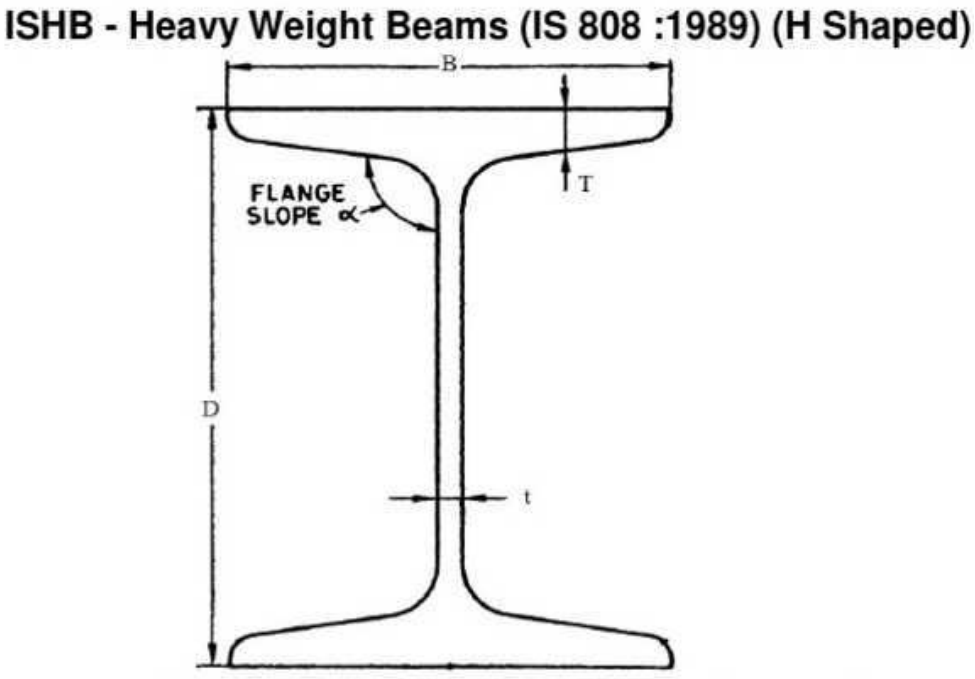


Fig 3. 20I-section

Table 3. 3Steel Section Properties Details

Floor	Beam	Column
Ground floor	ISHB225	ISHB450
First floor	ISHB225	ISHB450
Second floor	ISHB225	ISHB450
Third Floor	ISHB225	ISHB450

Table 3. 4Steel Section Geometric Properties

SIZE	Kg/m	Height D(mm)	Width B(mm)	Web Thickness t (mm)	Flange Thickness T (mm)	Flange Slope α°
ISHB225	43.10	225	225	6.50	9.10	94.00
ISHB450	87.20	450	250	9.80	13.70	94.00

All other inputs are given to perform pushover analysis in STAAD Pro are as mentioned in 3.1.3 of the thesis.

Model: 3> 3D Concentric Braced Frames

a. Steel Frame Without Bracing

3D steel frame model of G+ 3 storeys without bracings is considered for performance based seismic design analysis. 3D model of steel frame without bracing developed in STAAD Pro as shown in below fig. 3.21

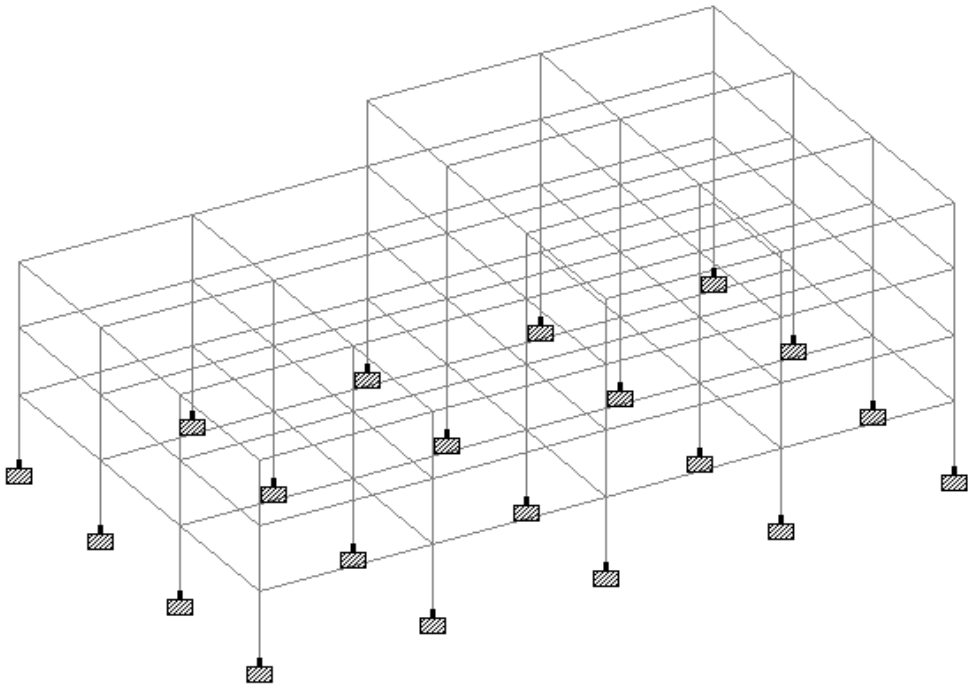


Fig 3. 21Steel Frame Without Bracing

Geometry of steel frame without bracing model in STAAD Pro is as mentioned in following table. 3.5

Table 3. 5Geometry of Steel Frame Without Bracing

NODE	X (m)	Y (m)	Z (m)
1	0	0	0
2	0	0	20
3	0	0	40
4	0	0	60
5	25	0	0
6	25	0	20
7	25	0	40
8	25	0	60
9	50	0	0
10	50	0	20
11	50	0	40
12	50	0	60
13	75	0	0
14	75	0	20
15	75	0	40
16	75	0	60
17	100	0	0
18	100	0	20
19	100	0	40
20	100	0	60
21	0	10	0
22	0	10	20
23	0	10	40
24	0	10	60
25	25	10	0
26	25	10	20
27	25	10	40
28	25	10	60
29	50	10	0
30	50	10	20
31	50	10	40
32	50	10	60
33	75	10	0
34	75	10	20
35	75	10	40
36	75	10	60
37	100	10	0
38	100	10	20
39	100	10	40
40	100	10	60

50	0	20	0
51	0	20	20
52	0	20	40
53	0	20	60
62	25	20	0
63	25	20	20
64	25	20	40
65	25	20	60
74	50	20	0
75	50	20	20
76	50	20	40
77	50	20	60
86	75	20	0
87	75	20	20
88	75	20	40
89	75	20	60
98	100	20	0
99	100	20	20
100	100	20	40
101	100	20	60
104	0	30	0
105	0	30	20
106	0	30	40
107	0	30	60
116	25	30	0
117	25	30	20
118	25	30	40
119	25	30	60
128	50	30	0
129	50	30	20
130	50	30	40
131	50	30	60
140	75	30	0
141	75	30	20
142	75	30	40
143	75	30	60
152	100	30	0
153	100	30	20
154	100	30	40
155	100	30	60
156	50	40	0
157	50	40	20
158	50	40	40
159	50	40	60

168	75	40	0
169	75	40	20
170	75	40	40
171	75	40	60
180	100	40	0
181	100	40	20
182	100	40	40
183	100	40	60

Material used to build 3D steel frame without bracing model issteel as shown in below fig. 3.22

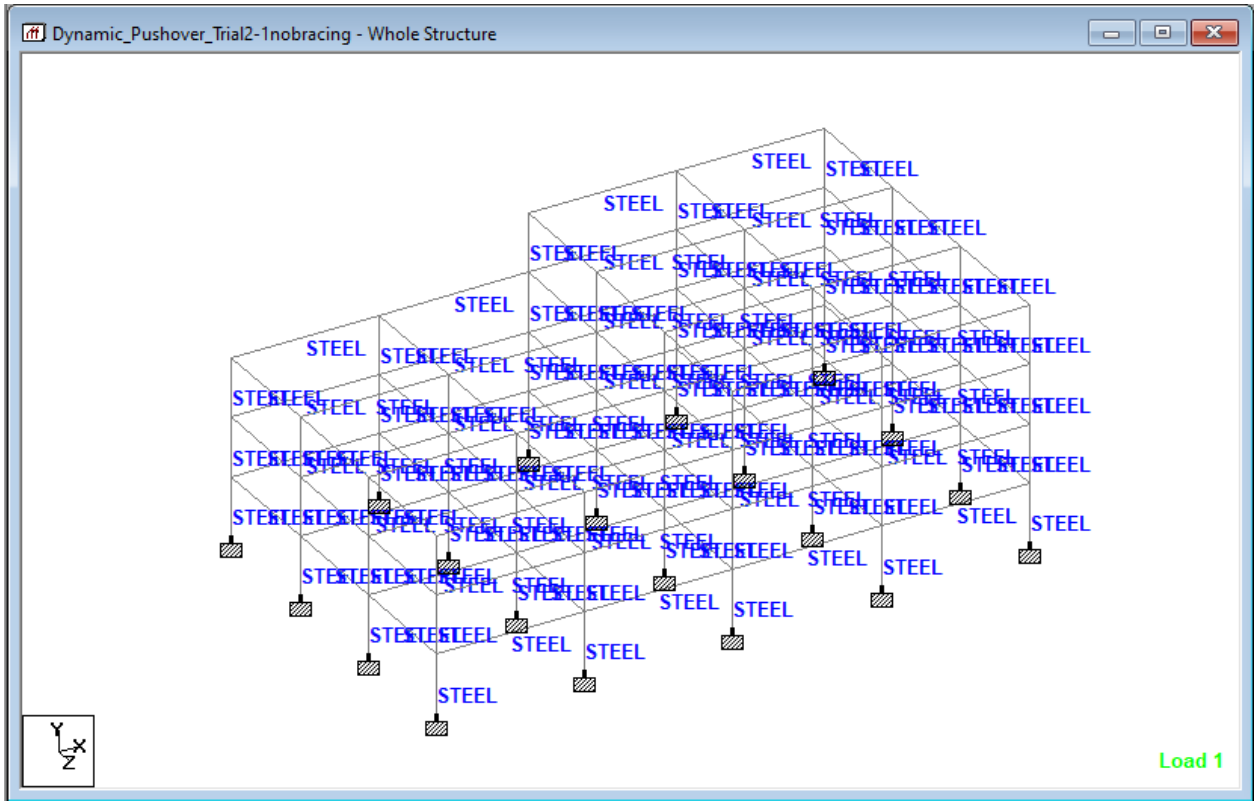


Fig 3. 22Material Properties of Steel Frame Without Bracings

Section properties of Beams and columns in 3D steel frame without bracings are as shown in below fig 3.23

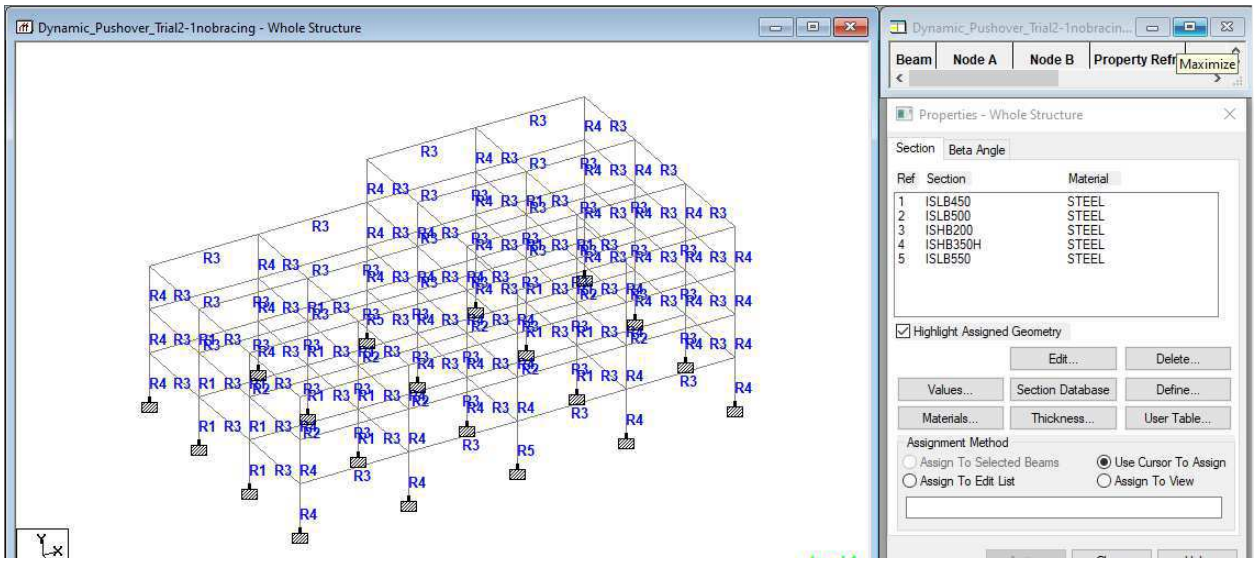


Fig 3. 23Section Property Window

Load case details to perform pushover analysis in STAAD Pro Advanced are followed as mentioned in 3.1.3 of thesis.

After analysis results are recorded in tabular and graphical format.

b. Steel Frame with External Bracing

3D steel frame model of G+ 4 storeys with external bracings philosophy is considered for performance based seismic design analysis. 3D model of steel frame with external bracings developed in STAAD Pro as shown in below fig.3.24

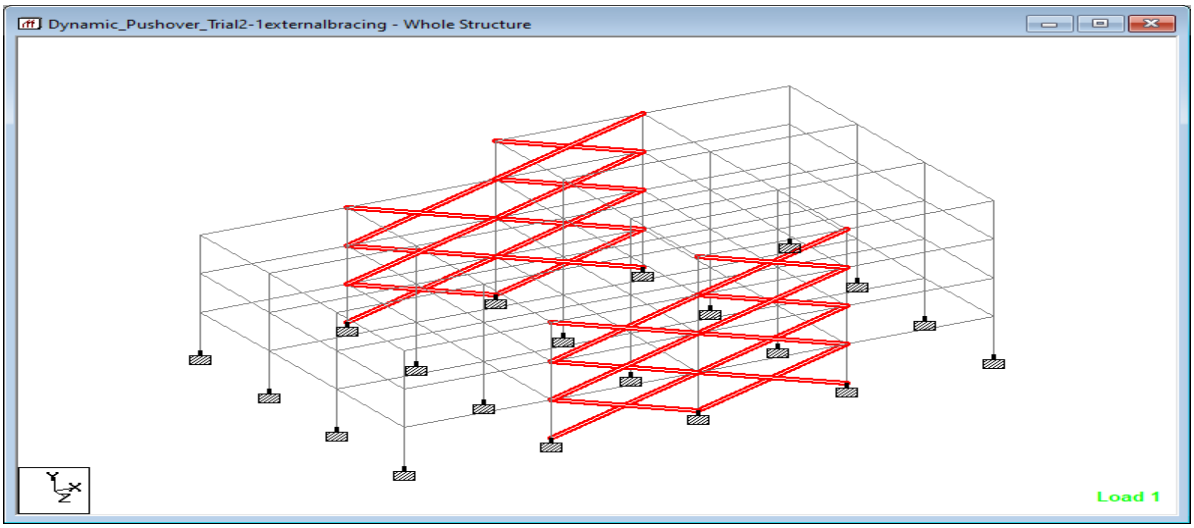


Fig 3. 24External Bracing in 3D Steel Frame

Material used to build 3D steel frame with external bracings model is steel as shown in below fig.3.25

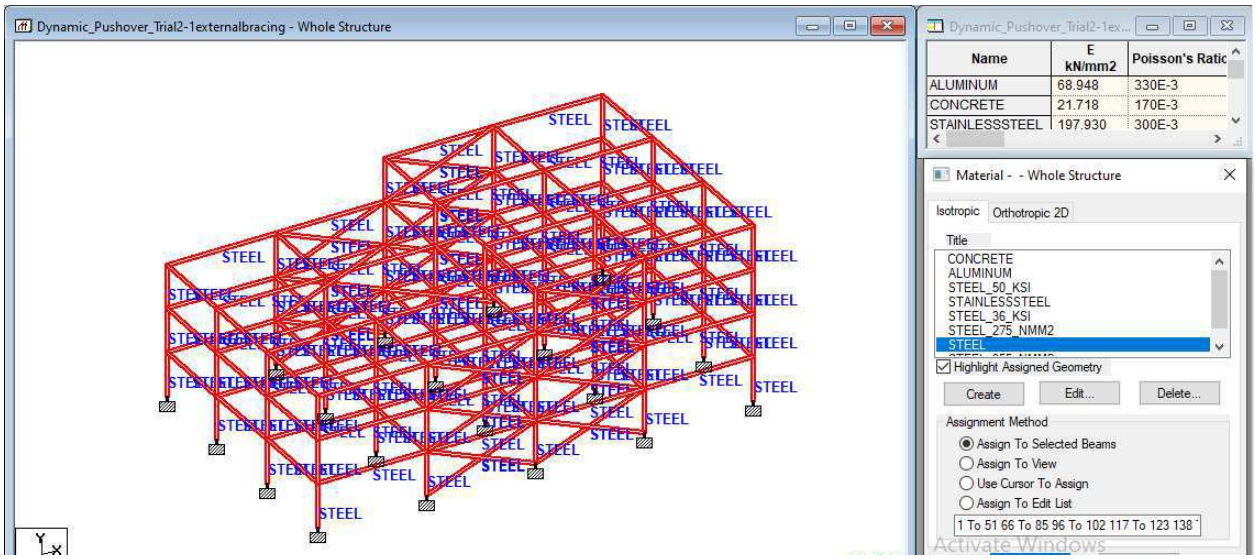


Fig 3. 25Material Property Details of 3D Externally Braced Steed Frame

Section properties of Beams and columns in 3D steel frame with external bracings frame are as shown in below fig.3.26

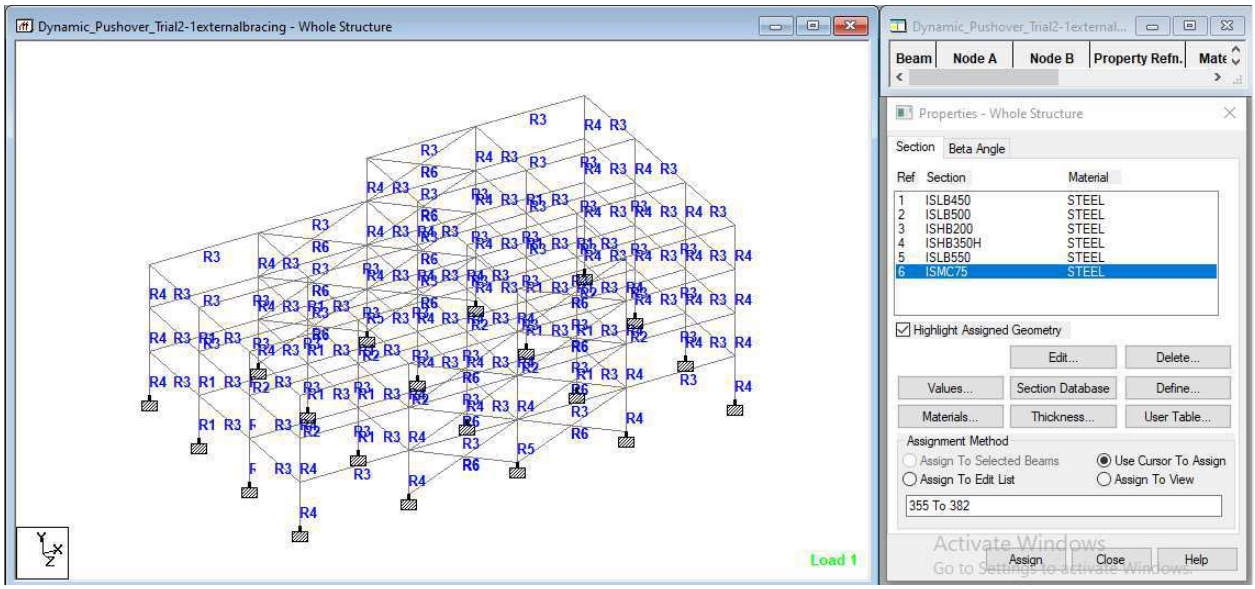


Fig 3. 26Section Properties of 3D Externally Braced Steel Frame

Load case details to perform pushover analysis in STAAD Pro Advanced are followed as mentioned in 3.1.3 of thesis.

After analysis results are recorded in tabular and graphical format.

c. Steel Frame with Optimum Bracing

3D steel frame model of G+ 4 storeys with optimum bracing philosophy is considered for performance based seismic design analysis. 3D model of steel frame with optimum bracings developed in STAAD Pro as shown in below fig.3.27

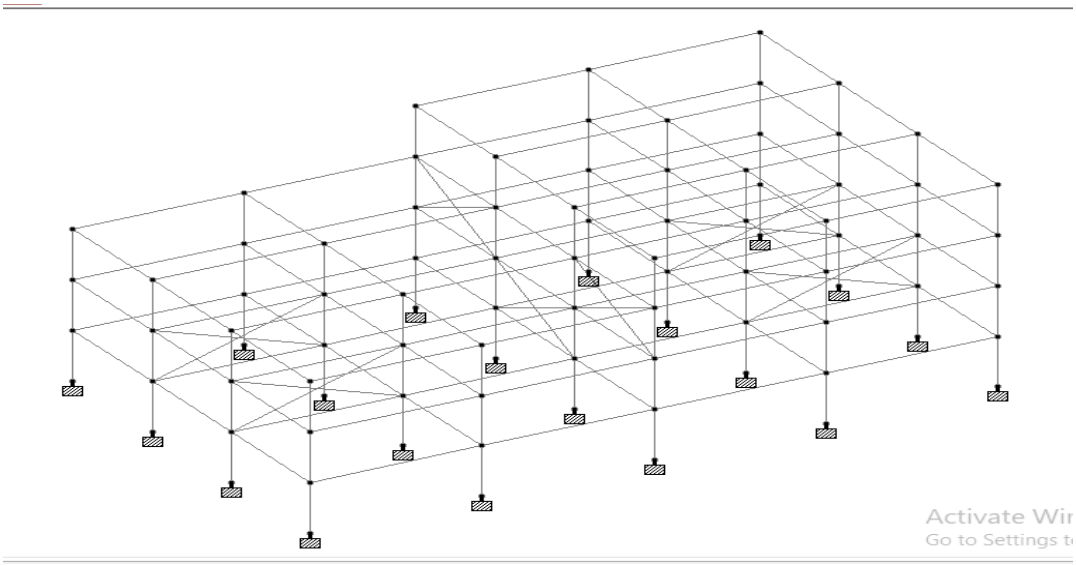


Fig 3. 27Steel Frame with Optimum Bracing

Geometry of steel frame with optimum bracing model in STAAD Pro is as mentioned in following table 3.6

Table 3. 6Geometry of Steel Frame Without Bracing

NODE	X (m)	Y (m)	Z (m)
1	0	0	0
2	0	0	20
3	0	0	40
4	0	0	60
5	25	0	0
6	25	0	20
7	25	0	40
8	25	0	60
9	50	0	0
10	50	0	20
11	50	0	40
12	50	0	60
13	75	0	0
14	75	0	20
15	75	0	40
16	75	0	60
17	100	0	0
18	100	0	20
19	100	0	40

20	100	0	60
21	0	10	0
22	0	10	20
23	0	10	40
24	0	10	60
25	25	10	0
26	25	10	20
27	25	10	40
28	25	10	60
29	50	10	0
30	50	10	20
31	50	10	40
32	50	10	60
33	75	10	0
34	75	10	20
35	75	10	40
36	75	10	60
37	100	10	0
38	100	10	20
39	100	10	40
40	100	10	60
50	0	20	0
51	0	20	20
52	0	20	40
53	0	20	60
62	25	20	0
63	25	20	20
64	25	20	40
65	25	20	60
74	50	20	0
75	50	20	20
76	50	20	40
77	50	20	60
86	75	20	0
87	75	20	20
88	75	20	40
89	75	20	60
98	100	20	0
99	100	20	20
100	100	20	40
101	100	20	60
104	0	30	0
105	0	30	20
106	0	30	40

107	0	30	60
116	25	30	0
117	25	30	20
118	25	30	40
119	25	30	60
128	50	30	0
129	50	30	20
130	50	30	40
131	50	30	60
140	75	30	0
141	75	30	20
142	75	30	40
143	75	30	60
152	100	30	0
153	100	30	20
154	100	30	40
155	100	30	60
156	50	40	0
157	50	40	20
158	50	40	40
159	50	40	60
168	75	40	0
169	75	40	20
170	75	40	40
171	75	40	60
180	100	40	0
181	100	40	20
182	100	40	40
183	100	40	60

Material used to build 3D steel frame with optimum bracing model is steel as shown in below fig.3.28

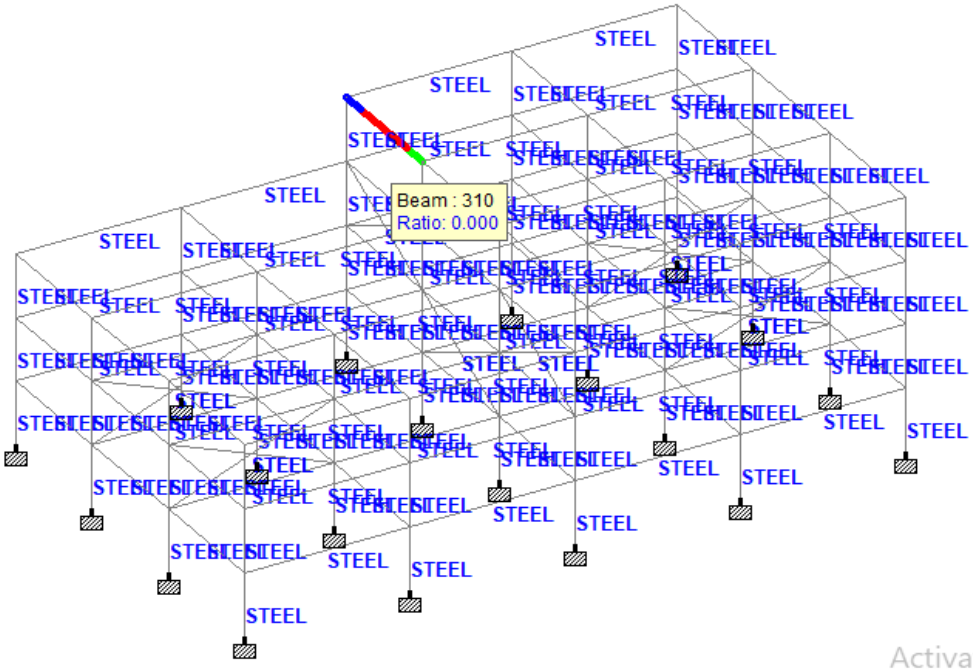


Fig 3. 28Material Property of Frame with Optimum Bracing

Section properties of Beams and columns in 3D steel frame with optimum bracing are as shown in below fig.3.29

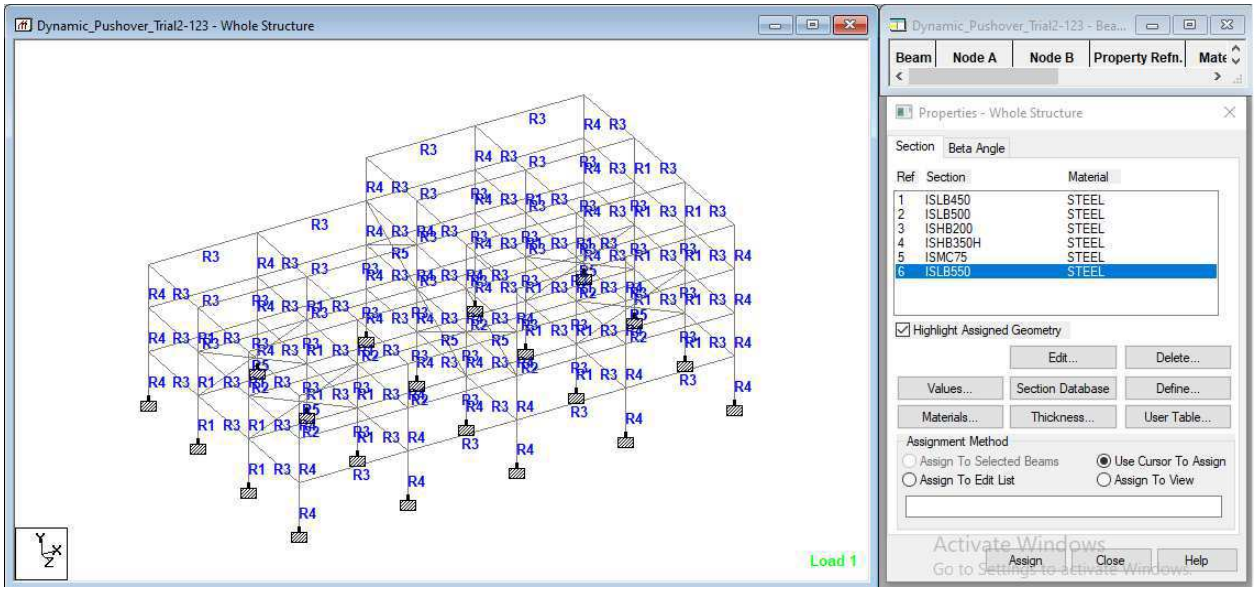


Fig 3. 29Section Properties of Steel Frame with Optimum Bracings

Load case details to perform pushover analysis in STAAD Pro Advanced are followed as mentioned in 3.1.3 of thesis.

After analysis results are recorded in tabular and graphical format

CHAPTER 4

RESULTS & DISCUSSION

4.1 2D Moment Resisting Frame

Total base shear of 314 KN is applied in step by step pushover analysis. Total steps to apply 314 KN base shears are 51 which caused maximum displacement of 130 mm in 2D steel moment resisting frame. Following is capacity curve of 2D moment resisting frame. On X- axis displacement at controlled joint is shown while on Y- axis base shear is represented.

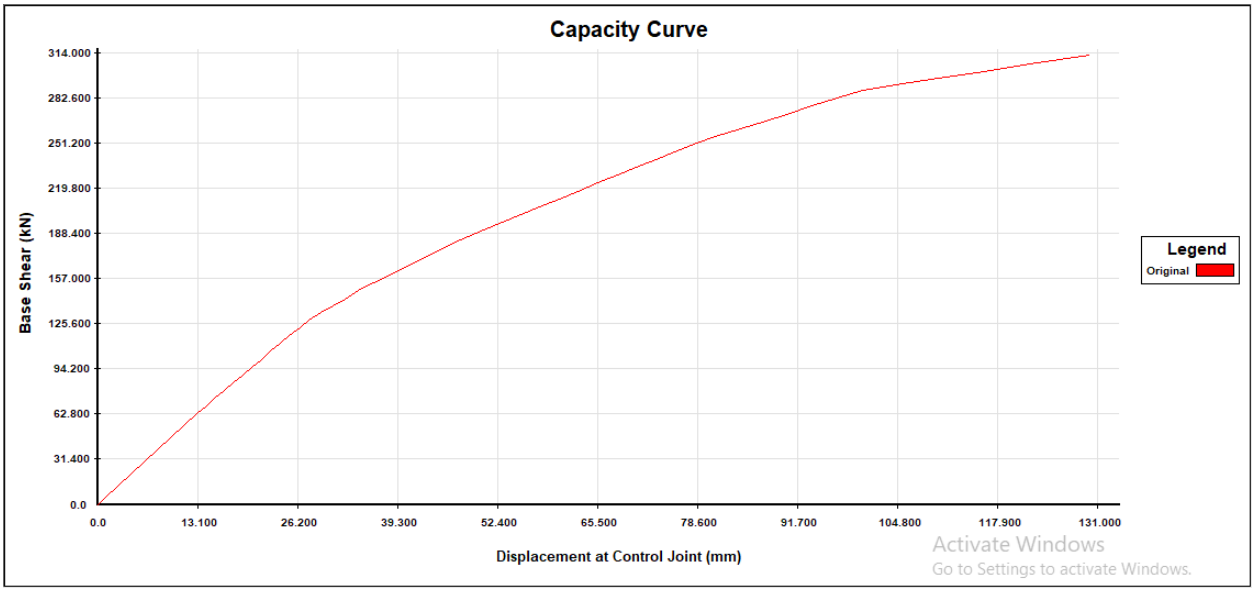


Fig 4. 1Capacity Curve of 2D moment resisting frame

Fig.1

Base shear is applied step by step in total 51 steps. During each step displacement caused at control joint is recoded which gives idea about the effect of push loads on steel frame. Following table contains Displacement results of 2D steel frame during each load step.

Table 4. 1Displacement due to Base Shear in 2D Moment Resisting Frame

Load Step (%s)	Displacement mm	Base Shear kip
1	0	0
2	1.112	1.236
3	2.71	3.013
4	13.054	14.358
5	14.165	15.48
6	15.39	16.716
7	16.614	17.951

8	17.838	19.187
9	19.062	20.423
10	20.287	21.659
11	21.511	22.894
12	22.735	24.13
13	23.959	25.366
14	25.184	26.601
15	26.535	27.837
16	27.768	28.956
17	29.278	30.183
18	30.859	31.289
19	32.409	32.361
20	34.176	33.583
21	36.211	34.819
22	38.018	35.904
23	40.053	37.126
24	42.111	38.362
25	44.17	39.597
26	46.228	40.833
27	48.533	42.069
28	50.614	43.173
29	53.105	44.395
30	55.45	45.538
31	57.968	46.767
32	60.501	48.002
33	63.035	49.238
34	65.569	50.474
35	68.102	51.709
36	70.636	52.945
37	73.17	54.181
38	75.703	55.416
39	78.474	56.652
40	81.03	57.782
41	84.263	59.007

42	87.107	60.066
43	90.368	61.28
44	93.687	62.516
45	97.005	63.752
46	100.323	64.988
47	106.434	66.223
48	110.172	66.894
49	116.282	67.991
50	123.166	69.227
51	130.051	70.462

All relative displacement in beams is as shown in following table 4.2

Table 4. 2Maximum Relative Displacement in Beams of 2D Moment Resisting Frame

Beam	L/C	Length m	Dist m	Max y mm	Dist m	Max mm	Dist m	Span/Max
1	1	3	2.25	0.161	2	0.161	2	>10000
2	1	3	1.25	-2.143	1.5	2.143	1.5	1400
3	1	3	1.75	0	0	0	1.75	
4	1	3	2.5	-0.087	0.75	0.087	0.75	>10000
5	1	3	2.25	-2.126	1.5	2.126	1.5	1411
6	1	3	1.5	0	0	0	1.5	
7	1	3	1.75	-0.087	0.75	0.087	0.75	>10000
8	1	3	1.5	-2.105	1.5	2.105	1.5	1425
9	1	3	1.25	0	0	0	1.25	
10	1	3	1.25	0.286	2	0.286	2	>10000
11	1	3	2.75	-2.321	1.5	2.321	1.5	1292
12	1	3	2	0	0	0.001	2	
13	1	3	2.5	-2.142	1.5	2.142	1.5	1400

14	1	3	2.75	-2.127	1.5	2.127	1.5	1411
15	1	3	2.5	-2.102	1.5	2.102	1.5	1427
16	1	3	2.5	-2.329	1.5	2.329	1.5	1288
17	1	3	2.25	0.161	1	0.161	1	>10000
18	1	3	1.75	-0.087	2.25	0.087	2.25	>10000
19	1	3	2.75	-0.088	2.25	0.088	2.25	>10000
20	1	3	1	0.286	1	0.286	1	>10000

Fig:4.2show the displacement in 2D moment resisting frame after the application of pushover loads.

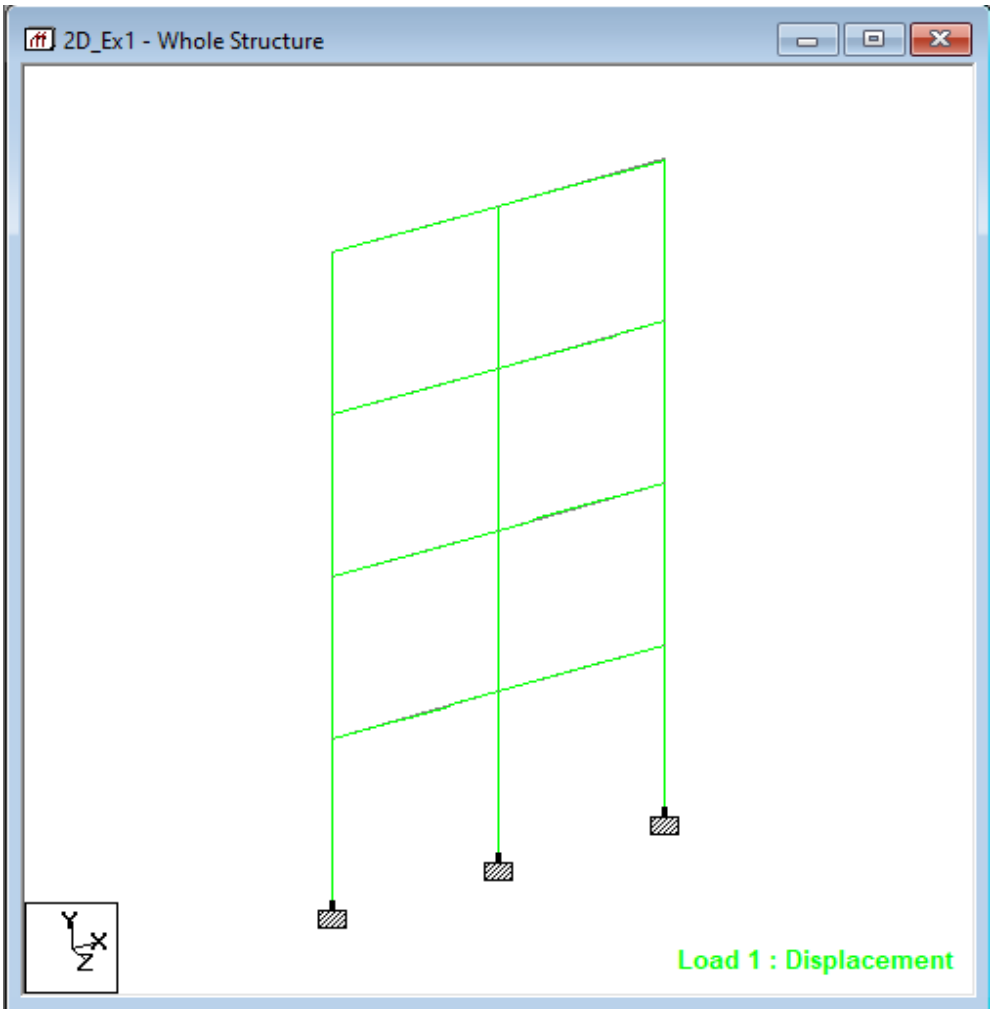


Fig 4. 2Displacement in 2D Moment Resisting Frame

Table4.2 contains data of maximum bending moment caused in 2D moment resisting frame due to considered earthquake loads. Fig shows the Bending moment diagram (BMD) of 2D moment resisting frame.

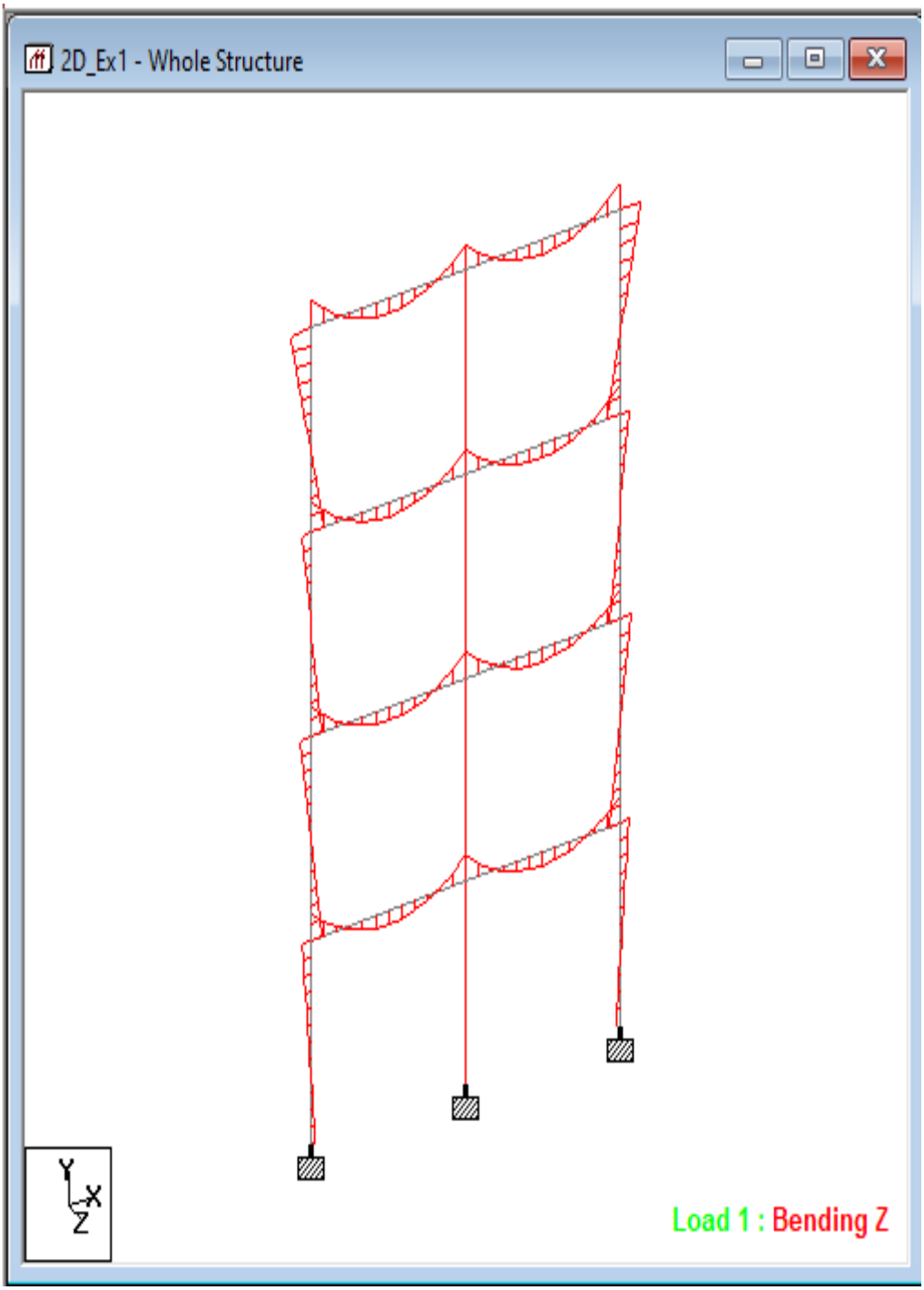


Fig 4. 3Bending Moment Diagram of 2D Moment Resisting Frame

Details of performance of 2D moment resisting frame after application of pushover loads discussed here. As the base shear applied displacement is recorded by the software. Also to find out in which performance level steel frame is at the particular base shear hinge formation status is also recorded by STAAD Pro. Advanced. At load step: 1 total bases shear of 0.000001KN is applied. At that point very less displacement and no hinge formation observed at controlled joint. Following fig4.4 shows the displacement and hinge formation status when Base shear is 0.000001KN.

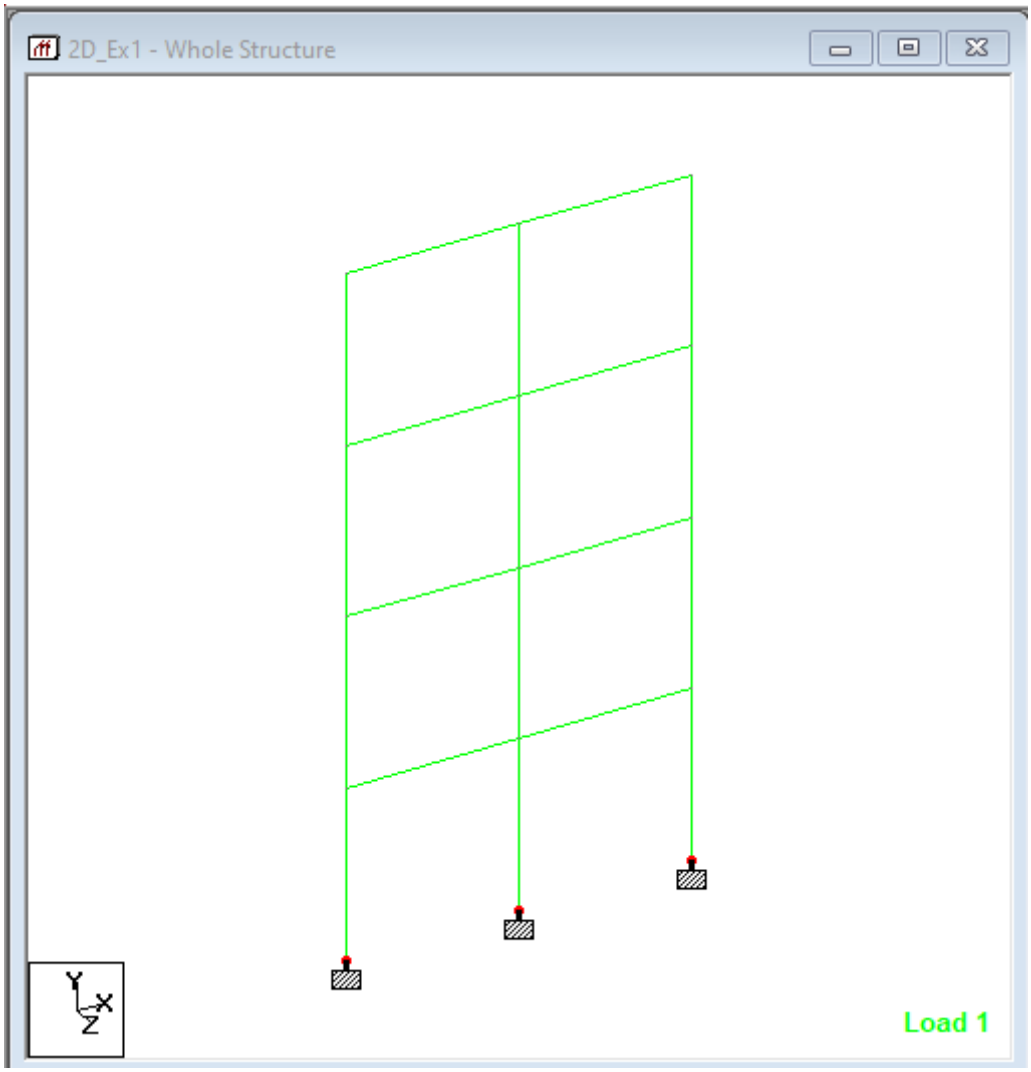


Fig 4. 4Hinge Formation Status when Base Shear is 0.000001KN

As no plastic hinge developed in the frame, frame lies in safe performance level. Hence no other performance level is added here. As no hinge formation is observed in this load condition hence every beam is performing linearly. Following table 10 shows the Hinge Status of 2D moment resisting frame.

Table 4. 3Hinge Status of 2D Moment Resisting Frame

Hinge Location Status								
Beam	**Status**	**Dir (Local)**	**Section m**	**Status**	**Section m**	**Status**	**Section m**	**Status**
1-20	Linear	-	-	-	-	-	-	-

During the lateral load step: 4, base shear of 63.867651KN is applied on 2D moment resisting frame. At this stage beam no: 3 failed as shown in fig:4.5

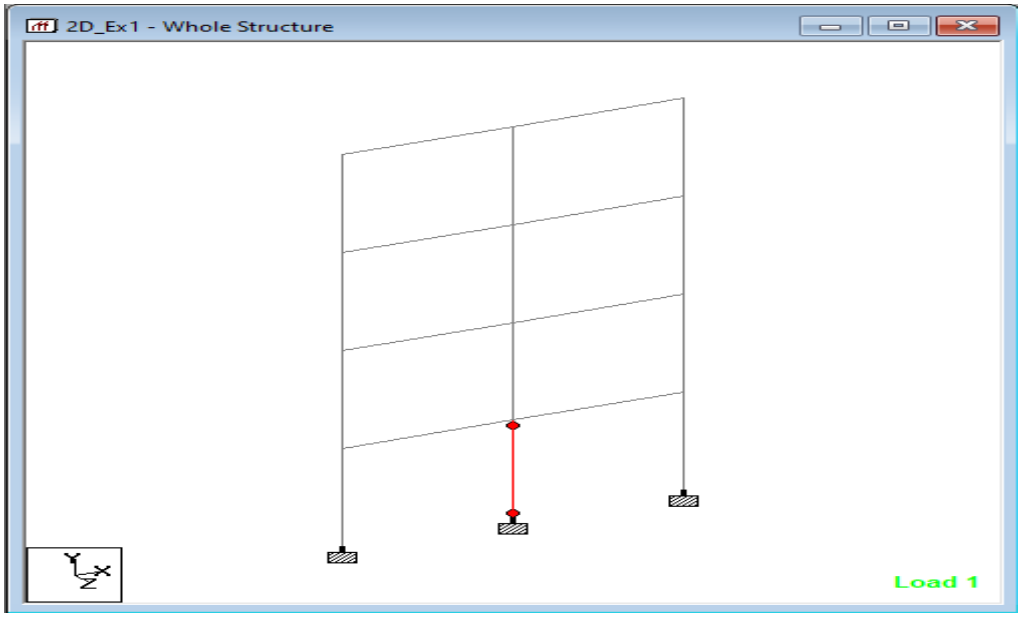


Fig 4. 5Hinge status when Base Shear is 63.867651KN

Even though beam no 3 collapsed frame is further analyzed as frame can till sustain on remaining two end columns. Displacement recorded at that point is as shown in Fig:4.6

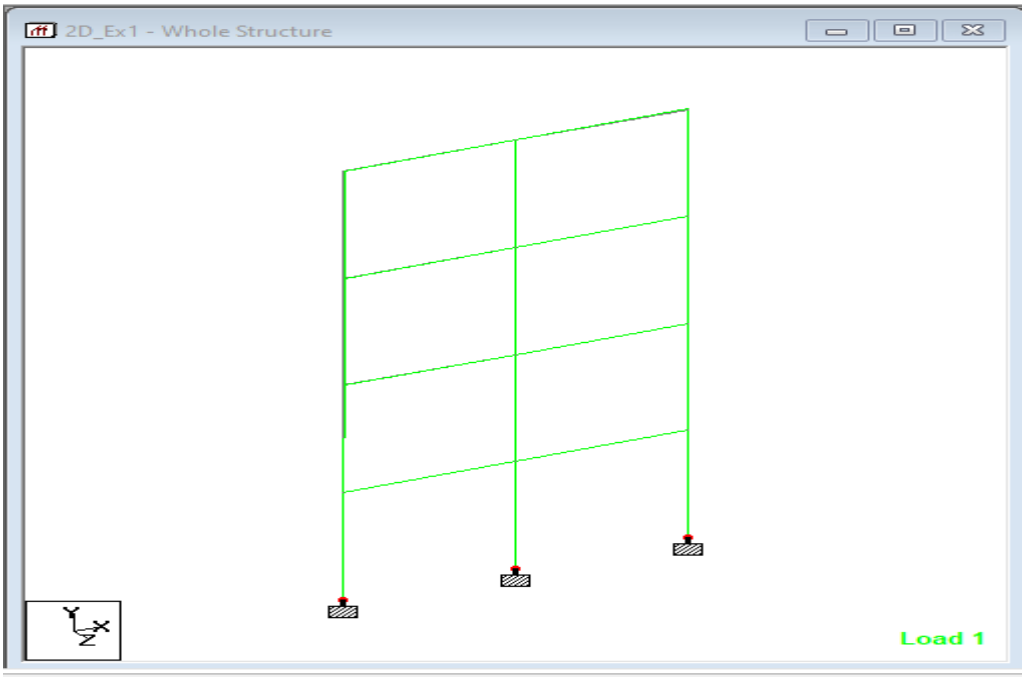


Fig 4. 6Displacement when Base Shear is 63.867651KN

At load step: 5 when base shear is 123.528230KN plastic hinge developed in beam no 14. At this stage beam no 14 started performing nonlinearly as shown in Fig: 4.7

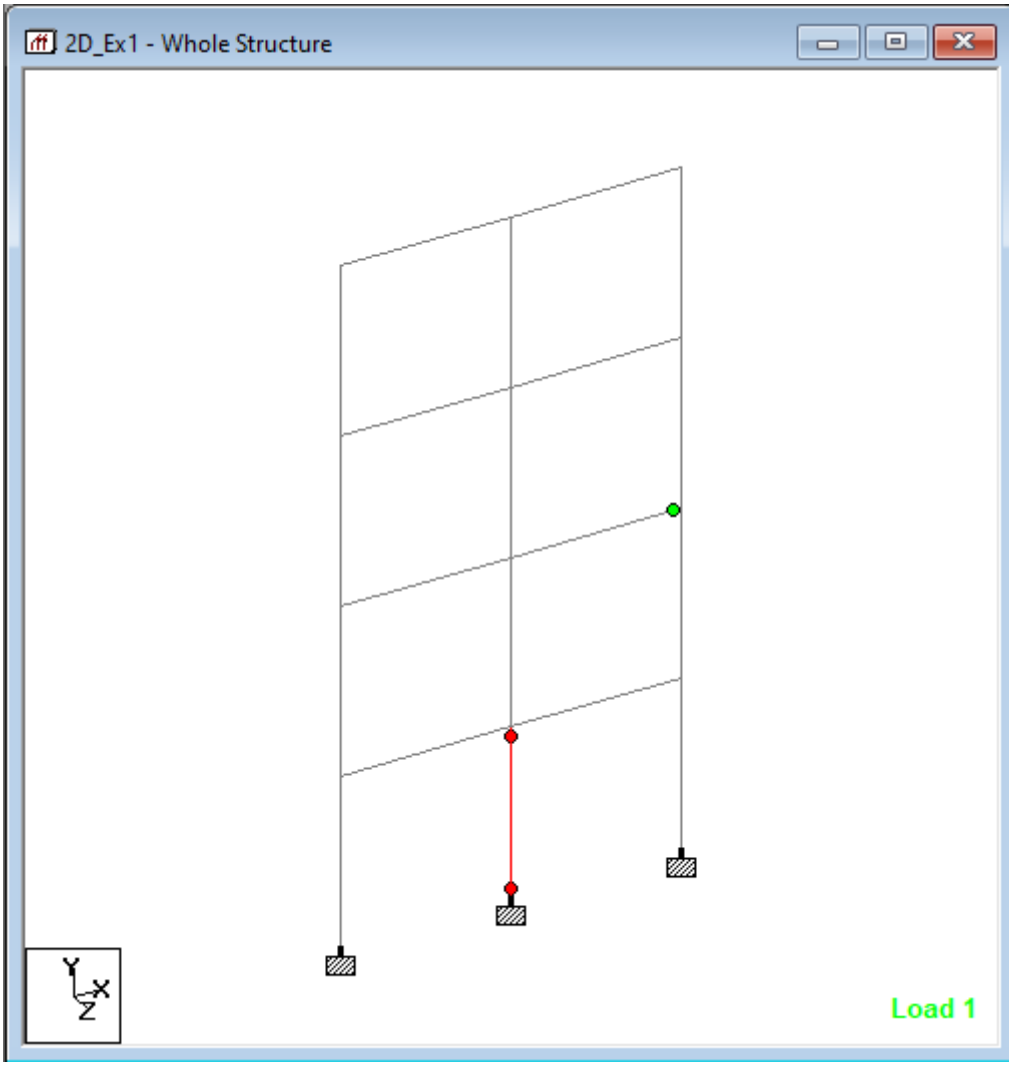


Fig 4. 7Hinge Status when Base Shear is 123.528230KN

Plastic hinge status of each beam in 2D moment resisting frame at load step 15, base shear 123.528230KN is as shown in Table 4.4

Table 4. 4Hinge Location Status of 2D Moment Frame

Beam	Status	Dir (Local)	Section m	Status
1-2	Linear			
3	Inactive			
4-13	Linear			
14	Nonlinear	Z	3	<= IO
15-20	Linear			

At the same stage displacement recorded at controlled joint is 26.536mm as shown in Fig:4.8

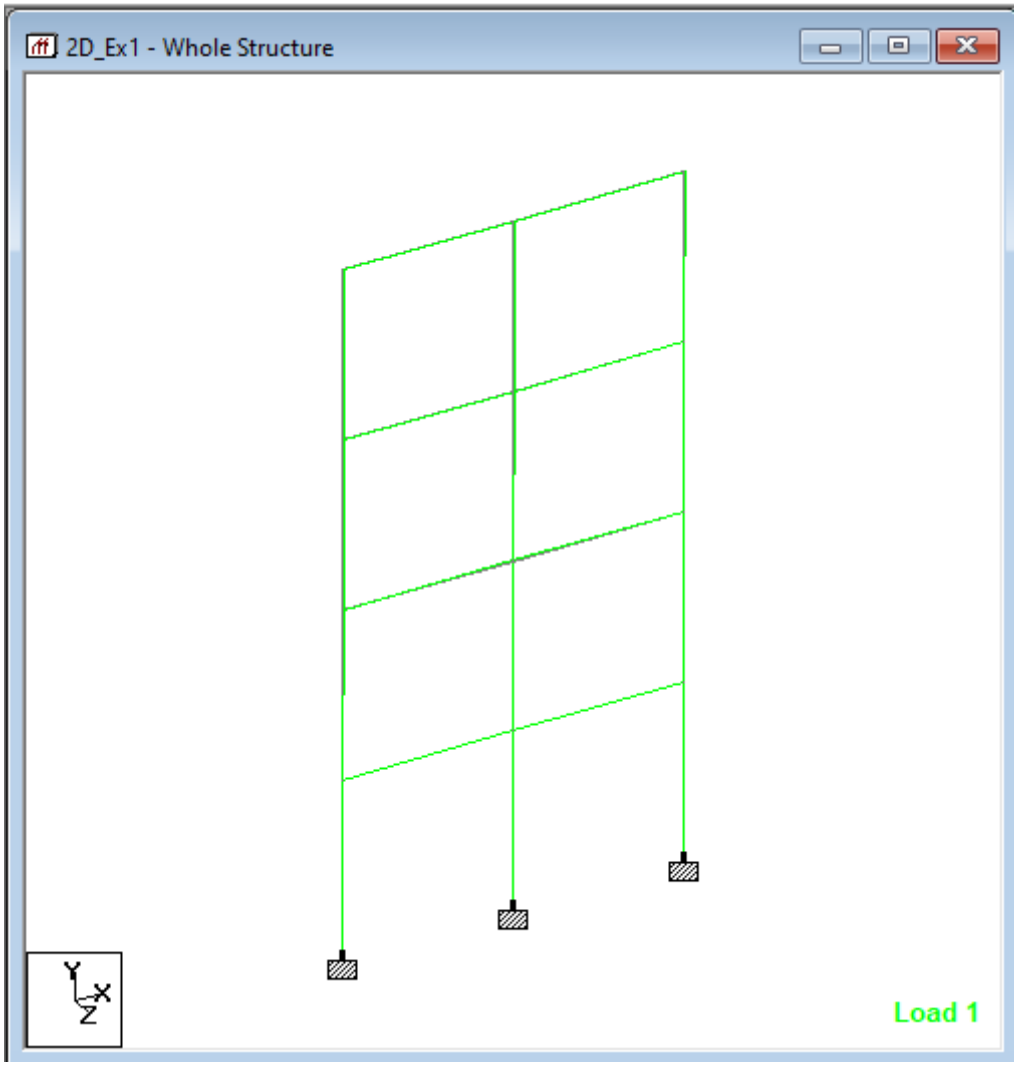


Fig 4. 8Displacement when Base Shear is 123.528230KN

Plastic hinge formation continued in 2D moment resisting frame until base shear reached the 313.432228KN value. At the load step 51, Beam no : 1,2,5,8,11,13,14,15,16 and 17 are started performing in IO performance level. At this point maximum beam started acting nonlinearly. Plastic hinge formation diagram is as shown in Fig:46 and Hinge location status in beam is computed in Table 4.5

Table 4. 5Hinge Location Status when Base Shear is 313.432228KN

Beam	Status	Dir (Local)	Section m	Status	Section m	Status
1	Nonlinear	Z	0	<= IO		
2	Nonlinear	Z			3	<= IO

3	Inactive					
4	Linear					
5	Nonlinear	Z			3	<= IO
6-7	Linear					
8	Nonlinear	Z			3	<= IO
9-10	Linear					
11	Nonlinear	Z			3	<= IO
12	Linear					
13	Nonlinear	Z			3	<= IO
14	Nonlinear	Z			3	<= IO
15	Nonlinear	Z			3	<= IO
16	Nonlinear	Z			3	<= IO
17	Nonlinear	Z			3	<= IO
18-20	Linear					

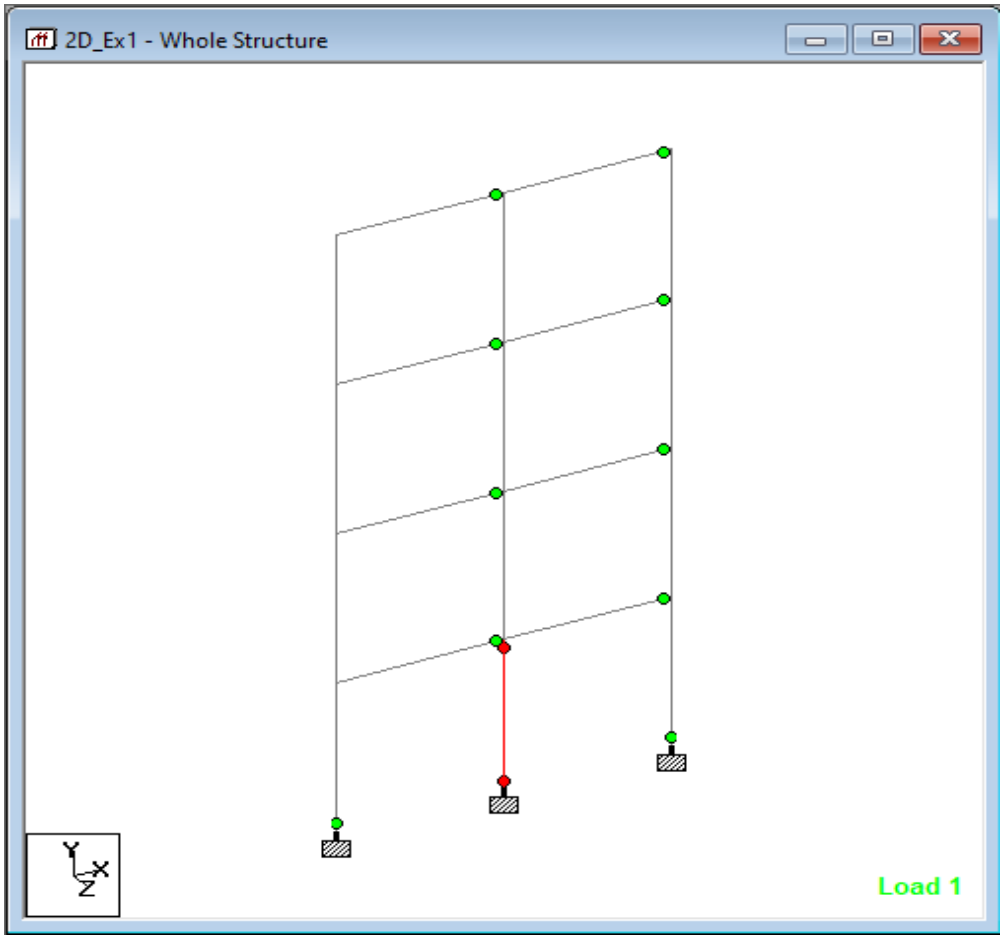


Fig 4. 9Hinge Status when Base Shear is 313.432228KN

4.23D Concentric Braced Frames

a. Steel Frame Without Bracing

After performing pushover analysis on the G+3 storey steel frame, frame performed linearly up to the base shear of 135.09KN then after it started performing nonlinearly as base shear increased. First plastic hinge shown by green is developed in column 9 and column 12 as shown in figure 47. Performance level at that point is IO. Further push load steps carried out, when base shear is increase up to 3758.82 KN blue colored plastic hinges developed at a column 5, 8, 13and 16 as shown in fig 48 which shows the structure lies in between IO – LS performance level. When base shear reached the value of 4218KN pink colored plastic hinges started developing into the column 5, 8, 13 and 16 as shown in fig 49 which implies that the those structural components lies in LS-CP performance level. At the base shear 4392.60 KN red colored plastic hinges started developing into the column 5, 8, 13 and 16 as shown in fig 8 which implies that the those structural components are in CP level. As the member of structure comes into the CP performance level base shear started redistributing to check the performance of other structural elements. Till that point no member were collapsed. First member column 5 and 8 failed at the base shear 4260.87KN and they are indicted by red color. But entire structure was not failed at those points as the maximum columns lies into the IO performance level as shown in fig50. After distributing and redistributing base shear up to the push load step 173 maximum number of beams and columns are into the CP level and LS level while some of them are collapsed as shown in fig when the redistributed base shear was 2380.60 KN. After that point entire structure will fail as maximum number of columns from base storey was failed as shown in fig 51. Capacity curve for moment frame is as shown in fig 10 in which X-axis indicates the displacement at roof due to base shear indicated on Y- axis.

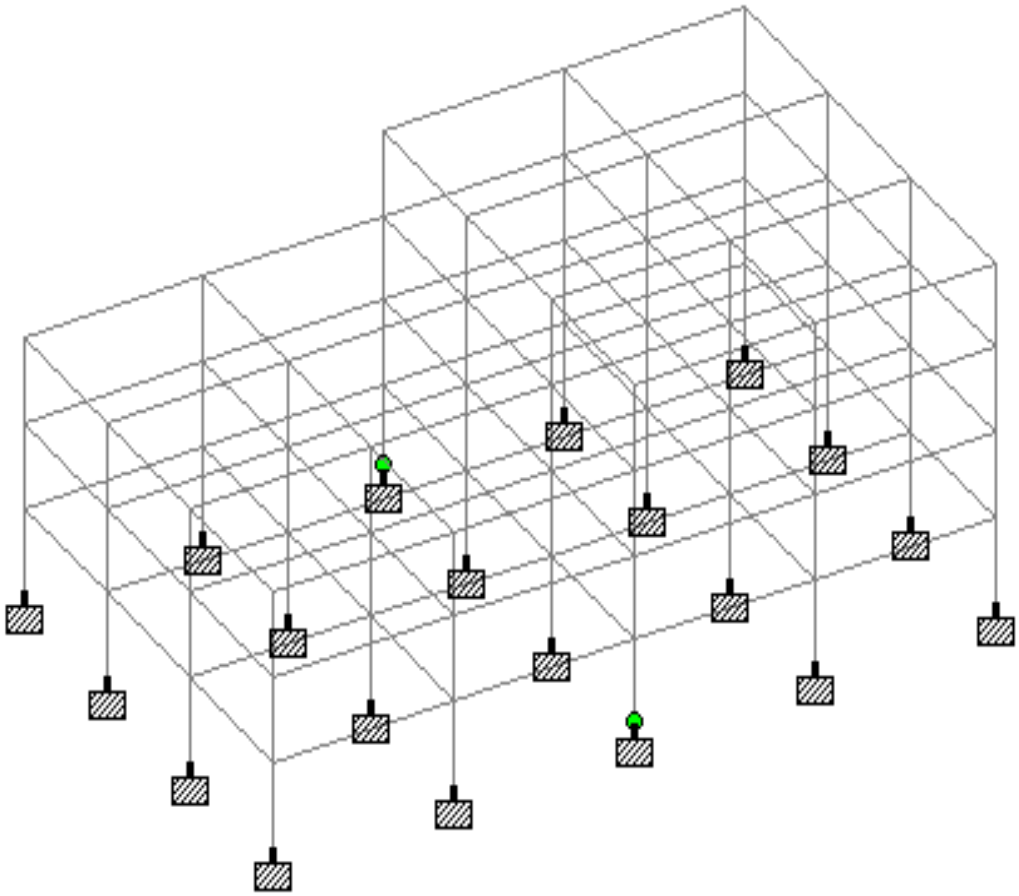


Fig 4. 10Members of Moment Steel Frame in IO Performance Level

Plastic hinge formation at load step: 4 when base shear is 135.097 KN is as computed in Table:4.6

Table 4. 6Hinge Location Status at 135 kn Base Shear

Beam	Status	Direction (Local)	Section m	Status	Section m	Status	Section m	Status
1-8	Linear							
9	Nonlinear	Z					3.048	<= IO
10-11	Linear							
12	Nonlinear	Z					3.048	<= IO
13-354	Linear							

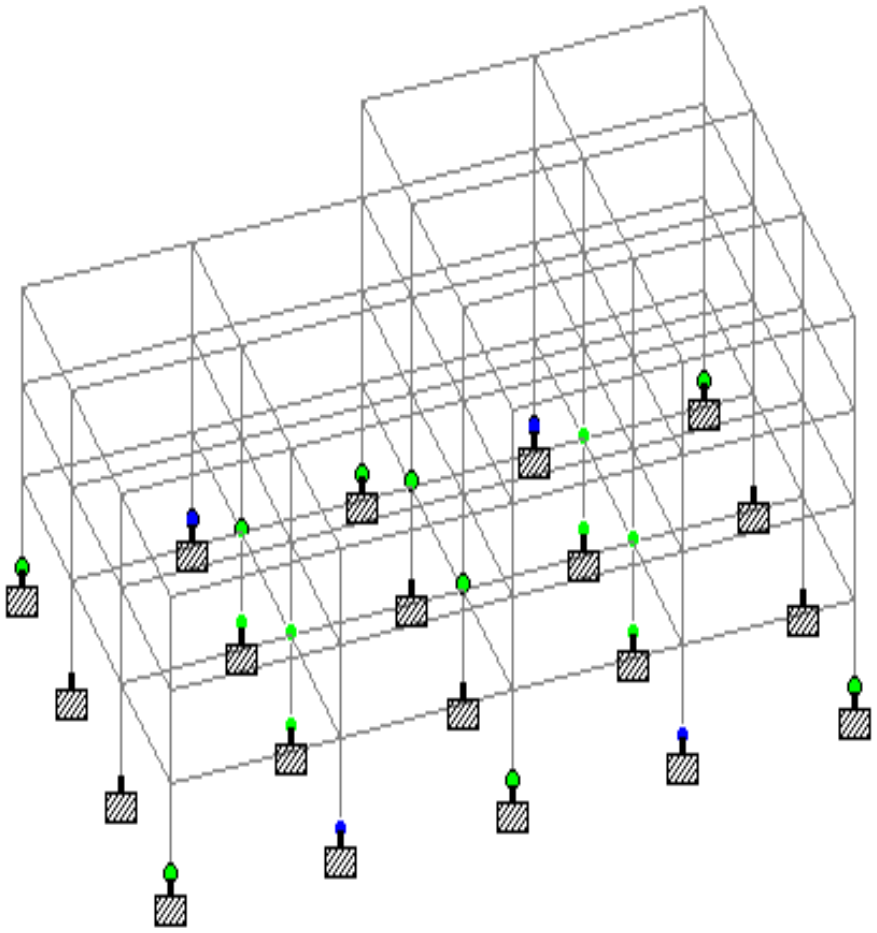


Fig 4. 11Members of Moment Steel Frame in IO-LS Performance Level

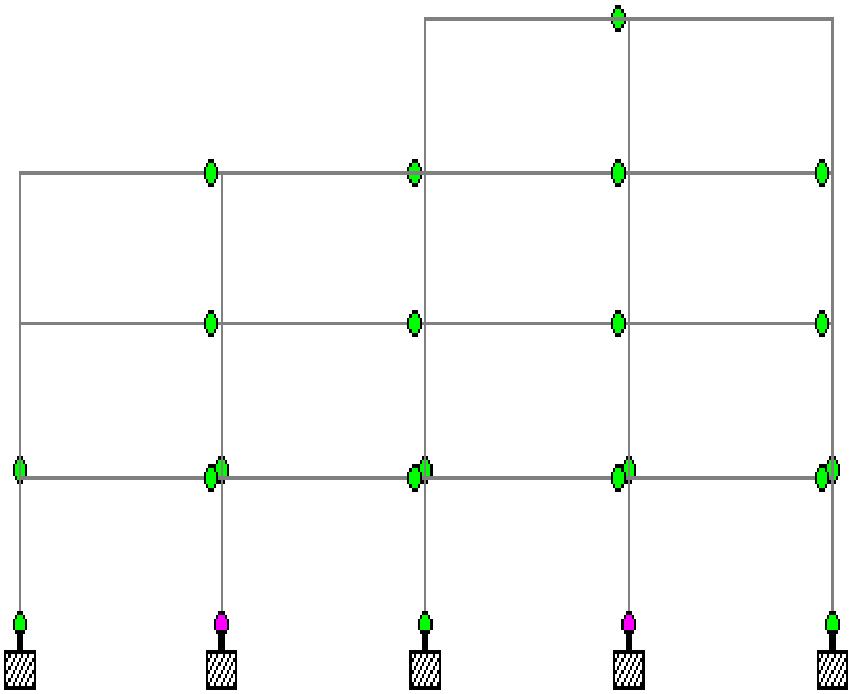


Fig 4. 12Members of Moment Steel Frame in LS-CP

Table:4.7 shows the plastic hinge location status of frame at the pushover load step: 25 when the base shear applied is 3758.822KN and displacement occurred at the controlled joint is 205.432 mm.

Table 4. 7Hinge location Status when base shear is 3758.822KN

Beam	Status	Dir (Local)	Section m	Status
1	Nonlinear	Z	3.048	<= IO
2-3	Linear			
4	Nonlinear	Z	3.048	<= IO
5	Nonlinear	Z	3.048	IO - LS
6	Nonlinear	Z	3.048	<= IO
7	Nonlinear	Z	3.048	<= IO
8	Nonlinear	Z	3.048	IO - LS
9	Nonlinear	Z	3.048	<= IO
10-11	Linear			
12	Nonlinear	Z	3.048	<= IO
13	Nonlinear	Z	3.048	IO - LS
14	Nonlinear	Z	3.048	<= IO
15	Nonlinear	Z	3.048	<= IO
16	Nonlinear	Z	3.048	IO - LS
17	Nonlinear	Z	3.048	<= IO
18-19	Linear			
20	Nonlinear	Z	3.048	<= IO
21-70	Linear			
71	Nonlinear	Z	3.048	<= IO
72	Nonlinear	Z	3.048	<= IO

73-74	Linear			
75	Nonlinear	Z	3.048	<= IO
76	Nonlinear	Z	3.048	<= IO
77-78	Linear			
79	Nonlinear	Z	3.048	<= IO
80	Nonlinear	Z	3.048	<= IO
81-354	Linear			

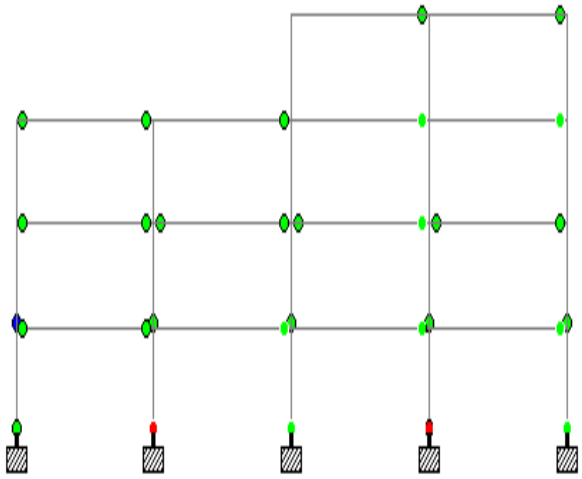


Fig 4. 13Members of Moment Steel Frame in CP

Table 4.8shows the plastic hinge formation status at load step:50 when base shear is 4218.078KN.

Table 4. 8Hinge Location Status when Base Shear is 4218.078KN

Beam	Status	Dir (Local)	Section m	Status	Section m	Status
1	Nonlinear	Z			3.048	<= IO
2	Nonlinear	Z			3.048	<= IO
3	Nonlinear	Z			3.048	<= IO
4	Nonlinear	Z			3.048	<= IO

5	Nonlinear	Z			3.048	LS - CP
6	Nonlinear	Z			3.048	<= IO
7	Nonlinear	Z			3.048	<= IO
8	Nonlinear	Z			3.048	LS - CP
9	Nonlinear	Z			3.048	<= IO
10	Nonlinear	Z			3.048	IO - LS
11	Nonlinear	Z			3.048	IO - LS
12	Nonlinear	Z			3.048	<= IO
13	Nonlinear	Z			3.048	LS - CP
14	Nonlinear	Z			3.048	<= IO
15	Nonlinear	Z			3.048	<= IO
16	Nonlinear	Z			3.048	LS - CP
17	Nonlinear	Z			3.048	<= IO
18	Nonlinear	Z			3.048	<= IO
19	Nonlinear	Z			3.048	<= IO
20	Nonlinear	Z			3.048	<= IO
21-23	Linear					
24	Nonlinear	Z	0	<= IO		
25-26	Linear					
27	Nonlinear	Z			7.62	<= IO
28-30	Linear					
31	Nonlinear	Z			7.62	<= IO
32-33	Linear					
34	Nonlinear	Z			7.62	<= IO

35	Linear					
36-37	Linear					
38	Nonlinear	Z			7.62	<= IO
39-40	Linear					
41	Nonlinear	Z			7.62	<= IO
42-44	Linear					
45	Nonlinear	Z			7.62	<= IO
46-47	Linear					
48	Nonlinear	Z			7.62	<= IO
49-66	Linear					
67	Nonlinear	Z			3.048	<= IO
68	Nonlinear	Z			3.048	<= IO
69-70	Linear					
71	Nonlinear	Z			3.048	<= IO
72	Nonlinear	Z			3.048	<= IO
73-74	Linear					
75	Nonlinear	Z			3.048	<= IO
76	Nonlinear	Z			3.048	<= IO
77-78	Linear					
79	Nonlinear	Z			3.048	<= IO
80	Nonlinear	Z			3.048	<= IO
81-82	Linear					
83	Nonlinear	Z			3.048	<= IO
84	Nonlinear	Z			3.048	<= IO

85-98	Linear					
100	Nonlinear	Z			7.62	<= IO
101	Nonlinear	Z			7.62	<= IO
102	Nonlinear	Z			7.62	<= IO
117-119	Linear					
120	Nonlinear	Z			7.62	<= IO
121	Nonlinear	Z			7.62	<= IO
122	Nonlinear	Z			7.62	<= IO
123	Nonlinear	Z			7.62	<= IO
138-140	Linear					
141	Nonlinear	Z			7.62	<= IO
142	Nonlinear	Z			7.62	<= IO
143	Nonlinear	Z			7.62	<= IO
144	Nonlinear	Z			7.62	<= IO
159-161	Linear					
162	Nonlinear	Z			7.62	<= IO
163	Nonlinear	Z			7.62	<= IO
164	Nonlinear	Z			7.62	<= IO
165	Nonlinear	Z			7.62	<= IO
180-212	Linear					
214	Nonlinear	Z			7.62	<= IO
215	Nonlinear	Z			7.62	<= IO
216	Nonlinear	Z			7.62	<= IO
217	Nonlinear	Z			7.62	<= IO

232-235	Linear					
236	Nonlinear	Z			7.62	<= IO
237	Nonlinear	Z			7.62	<= IO
238-255	Linear					
256	Nonlinear	Z			7.62	<= IO
257	Nonlinear	Z			7.62	<= IO
258	Nonlinear	Z			7.62	<= IO
259	Nonlinear	Z			7.62	<= IO
274-276	Linear					
277	Nonlinear	Z			7.62	<= IO
278	Nonlinear	Z			7.62	<= IO
279	Nonlinear	Z			7.62	<= IO
280	Nonlinear	Z			7.62	<= IO
295-313	Linear					
314	Nonlinear	Z			7.62	<= IO
315	Nonlinear	Z			7.62	<= IO
316-354	Linear					

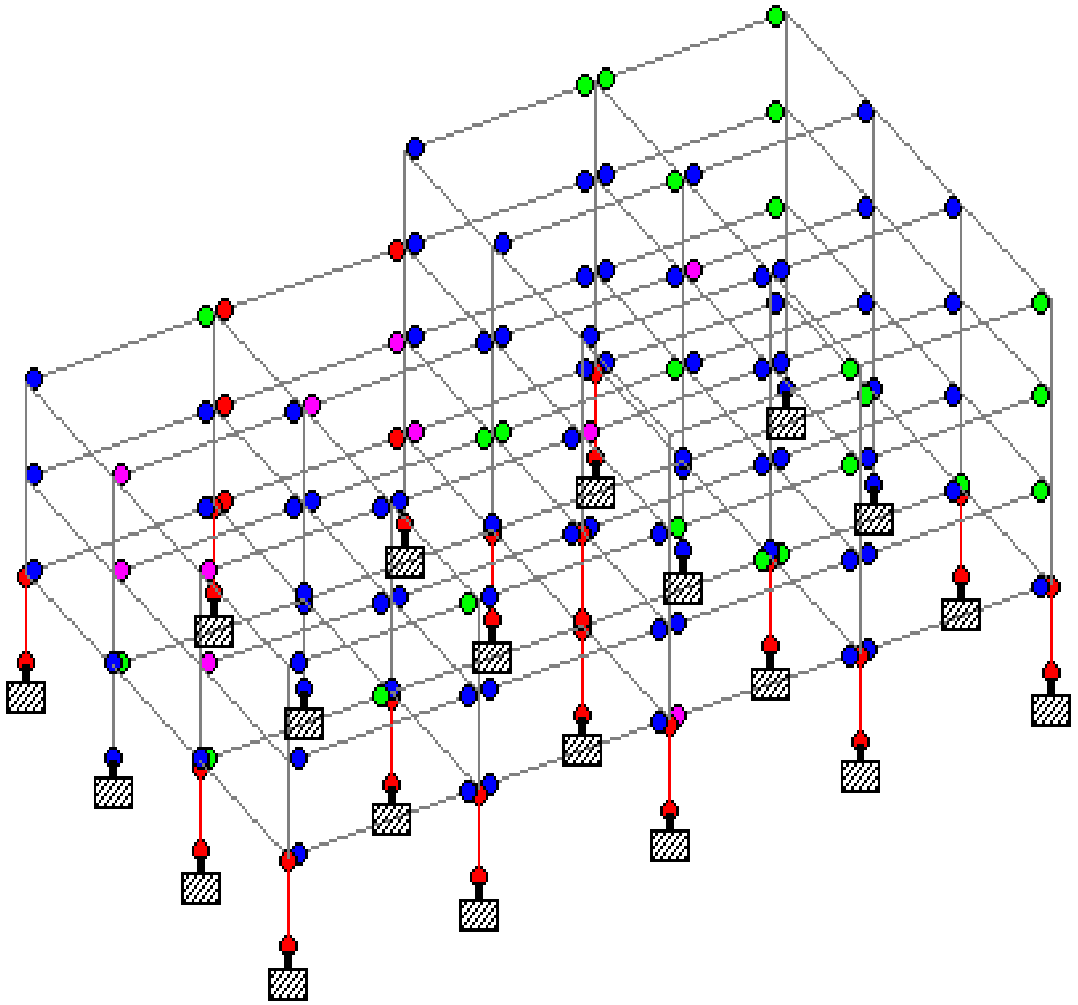


Fig 4. 14Members of Moment Steel Frame Failed in Pushover Analysis

Plastic hinge location status in load step:173 when base shear is 2380.605 KN is computed in Tabel 4.9

Table 4. 9Hinge location Status when Base Shear is 2380.605KN.

Beam	Status	Dir (Local)	Section m	Status	Section m	Status
1	Inactive					
2	Nonlinear	Z			3.048	IO - LS
3-5	Inactive					
6	Nonlinear	Z	0	IO - LS	3.048	IO - LS
7-8	Inactive					

9	Nonlinear	Z			3.048	>= CP
10-13	Inactive					
14	Nonlinear	Z	0	IO - LS	3.048	IO - LS
15-16	Inactive					
17	Nonlinear	Z			3.048	IO - LS
18	Nonlinear	Z			3.048	IO - LS
19-20	Inactive					
21-23	Linear					
24	Nonlinear	Z	0	IO - LS	7.62	IO - LS
25	Nonlinear	Z	0	<= IO		
26	Nonlinear	Z	0	<= IO	7.62	<= IO
27	Nonlinear	Z	0	IO - LS	7.62	IO - LS
28-30	Linear					
31	Nonlinear	Z	0	>= CP	7.62	>= CP
32-33	Linear					
34	Nonlinear	Z	0	IO - LS	7.62	IO - LS
35-37	Linear					
38	Nonlinear	Z	0	LS - CP	7.62	IO - LS
39	Linear					
40	Nonlinear	Z			7.62	<= IO
41	Nonlinear	Z	0	LS - CP	7.62	IO - LS
42-44	Linear					

45	Nonlinear	Z	0	IO - LS	7.62	IO - LS
46	Nonlinear	Z			7.62	<= IO
47	Nonlinear	Z	0	<= IO	7.62	IO - LS
48	Nonlinear	Z	0	IO - LS	7.62	IO - LS
49-66	Linear					
67	Nonlinear	Z			3.048	IO - LS
68	Nonlinear	Z			3.048	IO - LS
69-70	Linear					
71	Nonlinear	Z			3.048	IO - LS
72	Nonlinear	Z			3.048	IO - LS
73-74	Linear					
75	Nonlinear	Z			3.048	IO - LS
76	Inactive					
77-78	Linear					
79	Nonlinear	Z			3.048	IO - LS
80	Nonlinear	Z			3.048	IO - LS
81-82	Linear					
83	Nonlinear	Z			3.048	IO - LS
84	Nonlinear	Z			3.048	<= IO
85-98	Linear					
99	Nonlinear	Z	0	IO - LS	7.62	IO - LS
100	Nonlinear	Z	0	LS - CP	7.62	IO - LS
101	Nonlinear	Z	0	LS -	7.62	IO - LS

				CP		
102	Nonlinear	Z	0	IO - LS	7.62	IO - LS
117-119	Linear					
120	Nonlinear	Z	0	>= CP	7.62	LS - CP
121	Nonlinear	Z	0	IO - LS	7.62	<= IO
122	Nonlinear	Z	0	IO - LS	7.62	IO - LS
123	Nonlinear	Z	0	IO - LS	7.62	IO - LS
138-140	Linear					
141	Nonlinear	Z	0	IO - LS	7.62	IO - LS
142	Nonlinear	Z	0	<= IO	7.62	<= IO
143	Nonlinear	Z	0	IO - LS	7.62	IO - LS
144	Nonlinear	Z	0	IO - LS	7.62	IO - LS
159-161	Linear					
162	Nonlinear	Z	0	IO - LS	7.62	<= IO
163	Nonlinear	Z	0	IO - LS	7.62	IO - LS
164	Nonlinear	Z	0	IO - LS	7.62	IO - LS
165	Nonlinear	Z	0	IO - LS	7.62	<= IO
180-213	Linear					
214	Nonlinear	Z	0	IO - LS	7.62	<= IO
215	Nonlinear	Z	0	LS -	7.62	IO - LS

				CP		
216	Nonlinear	Z	0	LS - CP	7.62	IO - LS
217	Nonlinear	Z	0	IO - LS	7.62	<= IO
232-234	Linear					
235	Nonlinear	Z	0	>= CP	7.62	>= CP
236	Nonlinear	Z	0	LS - CP	7.62	IO - LS
237	Nonlinear	Z	0	IO - LS	7.62	IO - LS
238	Nonlinear	Z	0	IO - LS	7.62	IO - LS
253-255	Linear					
256	Nonlinear	Z	0	IO - LS	7.62	IO - LS
257	Nonlinear	Z	0	IO - LS	7.62	IO - LS
258	Nonlinear	Z	0	LS - CP	7.62	IO - LS
259	Nonlinear	Z	0	<= IO	7.62	<= IO
274-276	Linear					
277	Nonlinear	Z	0	IO - LS	7.62	<= IO
278	Nonlinear	Z	0	LS - CP	7.62	IO - LS
279	Nonlinear	Z	0	IO - LS	7.62	IO - LS
280	Nonlinear	Z	0	IO - LS	7.62	<= IO

295-312	Linear					
313	Nonlinear	Z	0	IO - LS	7.62	<= IO
314	Nonlinear	Z	0	IO - LS	7.62	<= IO
315	Nonlinear	Z	0	IO - LS	7.62	IO - LS
316	Nonlinear	Z			7.62	<= IO
331-333	Linear					
334	Nonlinear	Z	0	<= IO	7.62	<= IO
335	Nonlinear	Z	0	IO - LS	7.62	IO - LS
336	Nonlinear	Z	0	IO - LS	7.62	IO - LS
337	Nonlinear	Z			7.62	<= IO
352-354	Linear					

When base shear is 2380.605 KN during load step:173 displacement observed is 940.62mm.

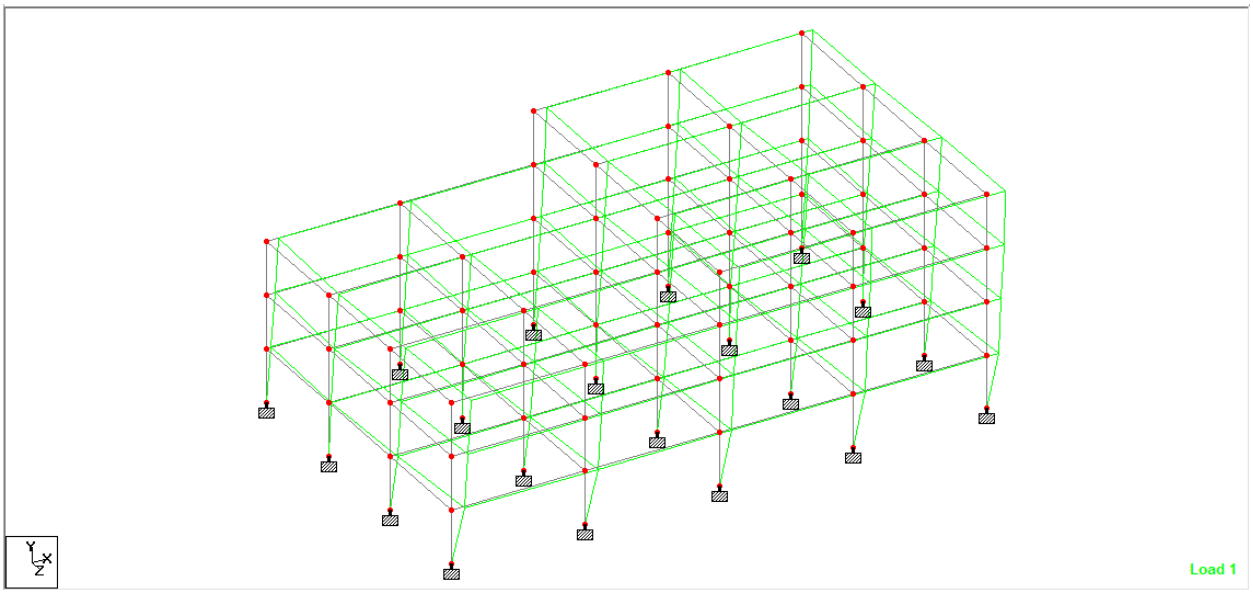


Fig 4. 15Displacement when base shear is 2380.605KN.

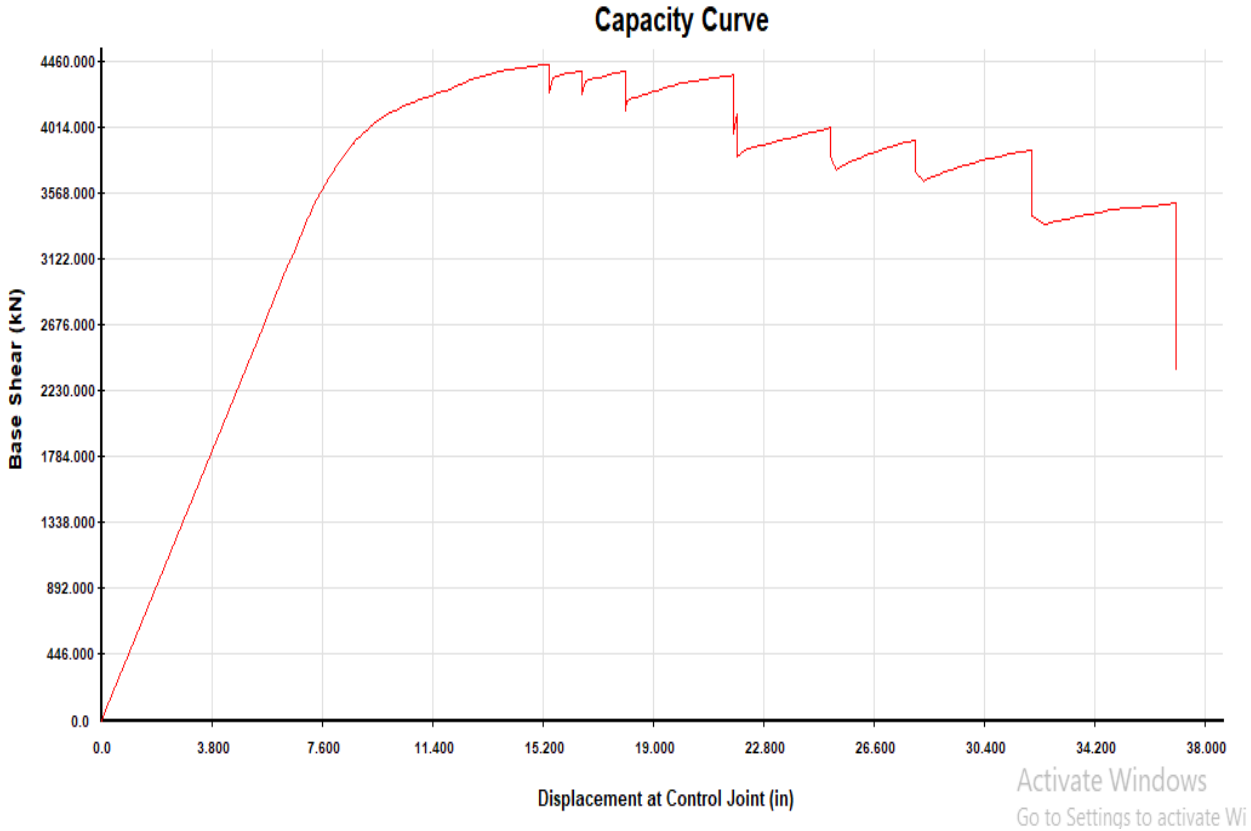


Fig 4. 16Capacity Curve of Moment Frame

In Table: 4.10values of base shear and displacement at that load are computed.

Table 4. 10Displacement and Base Shear values of 3D Frame without bracing

Load Step (%s)	Displacement mm	Base Shear kN
1	0	0
2	0.808	15.312
3	7.13	135.097
4	144.692	2741.101
5	147.934	2801.455
6	151.224	2862.703
7	154.514	2923.951
8	157.804	2985.199
9	161.094	3046.446

10	164.384	3107.694
11	167.673	3168.942
12	170.963	3230.19
13	174.253	3291.437
14	177.543	3352.685
15	180.833	3413.933
16	182.531	3444.557
17	185.251	3489.903
18	186.225	3504.198
19	189.332	3549.743
20	192.464	3595.679
21	193.538	3610.991
22	196.806	3655.731
23	199.15	3684.355
24	202.848	3728.198
25	205.432	3758.822
26	206.733	3774.134
27	209.303	3804.348
28	210.631	3819.66
29	211.905	3834.158
30	213.256	3848.976
31	216.133	3879.285
32	219.162	3909.165
33	220.858	3924.108
34	222.596	3938.632

35	224.414	3953.515
36	226.248	3968.217
37	228.182	3982.871
38	232.332	4012.994
39	234.42	4027.077
40	236.714	4041.484
41	241.507	4071.479
42	246.981	4102.103
43	249.689	4115.408
44	252.744	4130.424
45	256.908	4145.736
46	260.454	4158.202
47	264.725	4173.01
48	269.028	4187.92
49	273.517	4203.211
50	278.338	4218.078
51	283.497	4232.067
52	288.844	4246.098
53	294.438	4260.757
54	300.267	4276.034
55	306.11	4291.346
56	310.417	4306.658
57	314.467	4320.344
58	318.885	4335.204
59	323.421	4350.462

60	328.184	4365.774
61	334.095	4380.597
62	340.166	4392.605
63	347.582	4405.885
64	356.704	4419.854
65	367.204	4432.628
66	378.62	4444.883
67	385.052	4451.747
68	392.382	4459.365
69	392.382	4260.879
70	395.584	4370.19
71	399.251	4377.846
72	403.298	4385.502
73	407.613	4393.158
74	412.489	4400.814
75	417.487	4408.47
76	420.047	4412.298
77	420.047	4258.753
78	423.768	4347.573
79	427.989	4355.229
80	432.254	4362.885
81	436.435	4370.541
82	440.62	4378.197
83	444.81	4385.853
84	449.011	4393.509

85	458.212	4408.668
86	458.212	4146.124
87	459.72	4212.074
88	462.448	4219.73
89	465.175	4227.386
90	468.056	4235.042
91	471.057	4242.698
92	474.152	4250.354
93	477.298	4258.01
94	480.443	4265.666
95	483.589	4273.322
96	486.735	4280.978
97	489.971	4288.634
98	493.208	4296.29
99	496.444	4303.946
100	499.862	4311.602
101	503.344	4319.258
102	507.044	4326.914
103	512.151	4334.571
104	515.154	4338.399
105	518.156	4342.227
106	521.172	4346.055
107	524.187	4349.883
108	527.213	4353.711
109	530.274	4357.539

110	533.361	4361.367
111	536.519	4365.195
112	539.676	4369.023
113	542.898	4372.851
114	546.187	4376.679
115	549.511	4380.507
116	552.84	4384.335
117	552.84	3990.612
118	556.61	4121.995
119	556.61	3825.046
120	562.342	3876.098
121	569.874	3891.4
122	577.404	3906.697
123	584.932	3921.99
124	592.458	3937.279
125	599.982	3952.565
126	607.504	3967.846
127	615.024	3983.124
128	622.542	3998.397
129	630.059	4013.667
130	637.573	4028.933
131	637.573	3832.553
132	643.105	3746.222
133	646.684	3761.386
134	650.596	3776.558

135	654.683	3791.78
136	658.926	3806.961
137	663.776	3822.419
138	668.59	3837.762
139	673.369	3852.992
140	678.66	3868.233
141	684.303	3883.416
142	691.047	3898.729
143	698.052	3913.974
144	705.238	3929.301
145	712.35	3944.471
146	712.35	3732.837
147	719.28	3666.623
148	723.292	3681.884
149	727.733	3697.056
150	732.27	3712.259
151	738.141	3727.44
152	744.231	3742.685
153	750.403	3757.877
154	756.636	3773.087
155	762.912	3788.252
156	769.63	3803.427
157	776.758	3818.591
158	786.031	3833.794
159	795.283	3848.961

160	804.574	3864.175
161	813.831	3879.335
162	813.831	3424.072
163	826.234	3376.209
164	835.707	3391.919
165	845.171	3407.613
166	854.556	3423.176
167	863.85	3438.589
168	873.056	3453.855
169	882.594	3469.039
170	899.454	3484.259
171	920.036	3499.603
172	940.62	3514.948
173	940.62	2380.605

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Following table 4.11contain Status of hinge formation in the frame without bracing after completing pushover analysis.

Table 4. 11Hinge Status when Base Shear is 2380.605KN

Beam	Status	Dir (Local)	Section m	Status	Section m	Status
1	Inactive					
2	Nonlinear	Z			3.048	IO - LS
3-5	Inactive					
6	Nonlinear	Z	0	IO - LS	3.048	IO - LS
7-8	Inactive					

9	Nonlinear	Z			3.048	>= CP
10-13	Inactive					
14	Nonlinear	Z	0	IO - LS	3.048	IO - LS
15-16	Inactive					
17	Nonlinear	Z			3.048	IO - LS
18	Nonlinear	Z			3.048	IO - LS
19-20	Inactive					
21-23	Linear					
24	Nonlinear	Z	0	IO - LS	7.62	IO - LS
25	Nonlinear	Z	0	<= IO		
26	Nonlinear	Z	0	<= IO	7.62	<= IO
27	Nonlinear	Z	0	IO - LS	7.62	IO - LS
28-30	Linear					
31	Nonlinear	Z	0	>= CP	7.62	>= CP
32-33	Linear					
34	Nonlinear	Z	0	IO - LS	7.62	IO - LS
35-37	Linear					
38	Nonlinear	Z	0	LS - CP	7.62	IO - LS
39	Linear					
40	Nonlinear	Z			7.62	<= IO
41	Nonlinear	Z	0	LS - CP	7.62	IO - LS
42-44	Linear					
45	Nonlinear	Z	0	IO - LS	7.62	IO - LS
46	Nonlinear	Z			7.62	<= IO

47	Nonlinear	Z	0	<= IO	7.62	IO - LS
48	Nonlinear	Z	0	IO - LS	7.62	IO - LS
49-66	Linear					
67	Nonlinear	Z			3.048	IO - LS
68	Nonlinear	Z			3.048	IO - LS
69-70	Linear					
71	Nonlinear	Z			3.048	IO - LS
72	Nonlinear	Z			3.048	IO - LS
73-74	Linear					
75	Nonlinear	Z			3.048	IO - LS
76	Inactive					
77-78	Linear					
79	Nonlinear	Z			3.048	IO - LS
80	Nonlinear	Z			3.048	IO - LS
81-82	Linear					
83	Nonlinear	Z			3.048	IO - LS
84	Nonlinear	Z			3.048	<= IO
85-98	Linear					
99	Nonlinear	Z	0	IO - LS	7.62	IO - LS
100	Nonlinear	Z	0	LS - CP	7.62	IO - LS
101	Nonlinear	Z	0	LS - CP	7.62	IO - LS
102	Nonlinear	Z	0	IO - LS	7.62	IO - LS
117-119	Linear					

120	Nonlinear	Z	0	>= CP	7.62	LS - CP
121	Nonlinear	Z	0	IO - LS	7.62	<= IO
122	Nonlinear	Z	0	IO - LS	7.62	IO - LS
123	Nonlinear	Z	0	IO - LS	7.62	IO - LS
138-140	Linear					
141	Nonlinear	Z	0	IO - LS	7.62	IO - LS
142	Nonlinear	Z	0	<= IO	7.62	<= IO
143	Nonlinear	Z	0	IO - LS	7.62	IO - LS
144	Nonlinear	Z	0	IO - LS	7.62	IO - LS
159-161	Linear					
162	Nonlinear	Z	0	IO - LS	7.62	<= IO
163	Nonlinear	Z	0	IO - LS	7.62	IO - LS
164	Nonlinear	Z	0	IO - LS	7.62	IO - LS
165	Nonlinear	Z	0	IO - LS	7.62	<= IO
180-213	Linear					
214	Nonlinear	Z	0	IO - LS	7.62	<= IO
215	Nonlinear	Z	0	LS - CP	7.62	IO - LS
216	Nonlinear	Z	0	LS - CP	7.62	IO - LS
217	Nonlinear	Z	0	IO - LS	7.62	<= IO
232-234	Linear					

235	Nonlinear	Z	0	>= CP	7.62	>= CP
236	Nonlinear	Z	0	LS - CP	7.62	IO - LS
237	Nonlinear	Z	0	IO - LS	7.62	IO - LS
238	Nonlinear	Z	0	IO - LS	7.62	IO - LS
253-255	Linear					
256	Nonlinear	Z	0	IO - LS	7.62	IO - LS
257	Nonlinear	Z	0	IO - LS	7.62	IO - LS
258	Nonlinear	Z	0	LS - CP	7.62	IO - LS
259	Nonlinear	Z	0	<= IO	7.62	<= IO
274-276	Linear					
277	Nonlinear	Z	0	IO - LS	7.62	<= IO
278	Nonlinear	Z	0	LS - CP	7.62	IO - LS
279	Nonlinear	Z	0	IO - LS	7.62	IO - LS
280	Nonlinear	Z	0	IO - LS	7.62	<= IO
295-312	Linear					
313	Nonlinear	Z	0	IO - LS	7.62	<= IO
314	Nonlinear	Z	0	IO - LS	7.62	<= IO
315	Nonlinear	Z	0	IO - LS	7.62	IO - LS
316	Nonlinear	Z			7.62	<= IO
331-333	Linear					

334	Nonlinear	Z	0	<= IO	7.62	<= IO
335	Nonlinear	Z	0	IO - LS	7.62	IO - LS
336	Nonlinear	Z	0	IO - LS	7.62	IO - LS
337	Nonlinear	Z			7.62	<= IO
352-354	Linear					

b.Steel Frame with External Bracing

G+3 storey frame with analyzed by static nonlinear process, frame performed linearly up to the base shear 137.70KN. When base shear is 3879.86KN column 6,7,14 and 15 are in IO performance level as green colored plastic hinges developed in it as shown in fig54. When base shear reached the value 5161.37KN column10 and 11 is in IO – LS performance level as shown in fig 55 column 10 and 11 reached LS-CP performance level at base shear 5406.2794KN and in complete CP level when base shear 5545.04KN as shown in fig 56. Bracing provided started failing when base shear 5636.119KN as shown in fig 57.It is observed that due to external bracings lateral load carrying capacity of structure is increased but displacement is also more which laid to failure of structure. After that base shear redistributed up to the push load stem 231 and the Maximum columns of basement were failed at base shear 6039.11KN. After which entire structure will collapses. Capacity curve obtained for this frame is as shown in fig 4.18.

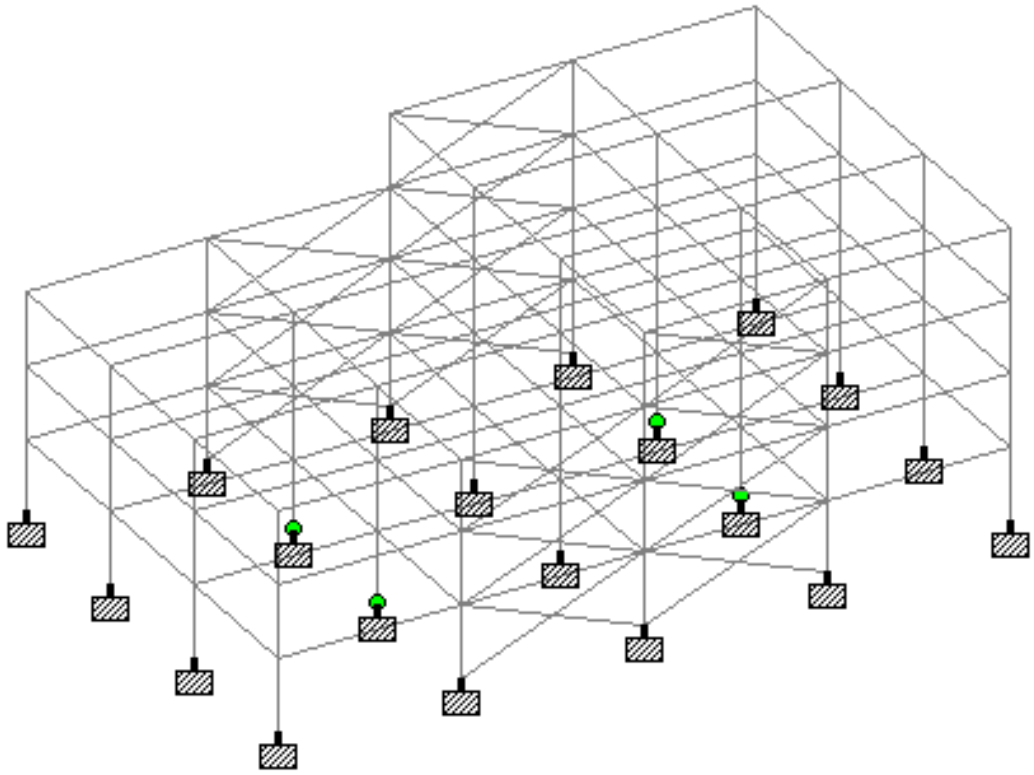

Fig 4. 17Members of Externally Braced Steel Frame in IO

When base shear is 3879.864 KN during load step: 4, plastic hinge status is computed in Table 4.12

Table 4. 12Hinge Location Status when Base Shear is 3879.864KN

Beam	Status	Dir (Local)	Section m	Status	Section m	Status	Section m	Status
1-5	Linear							
6	Nonlinear	Z					3.048	<= IO
7	Nonlinear	Z					3.048	<= IO
8-13	Linear							
14	Nonlinear	Z					3.048	<= IO
15	Nonlinear	Z					3.048	<= IO
16-382	Linear							

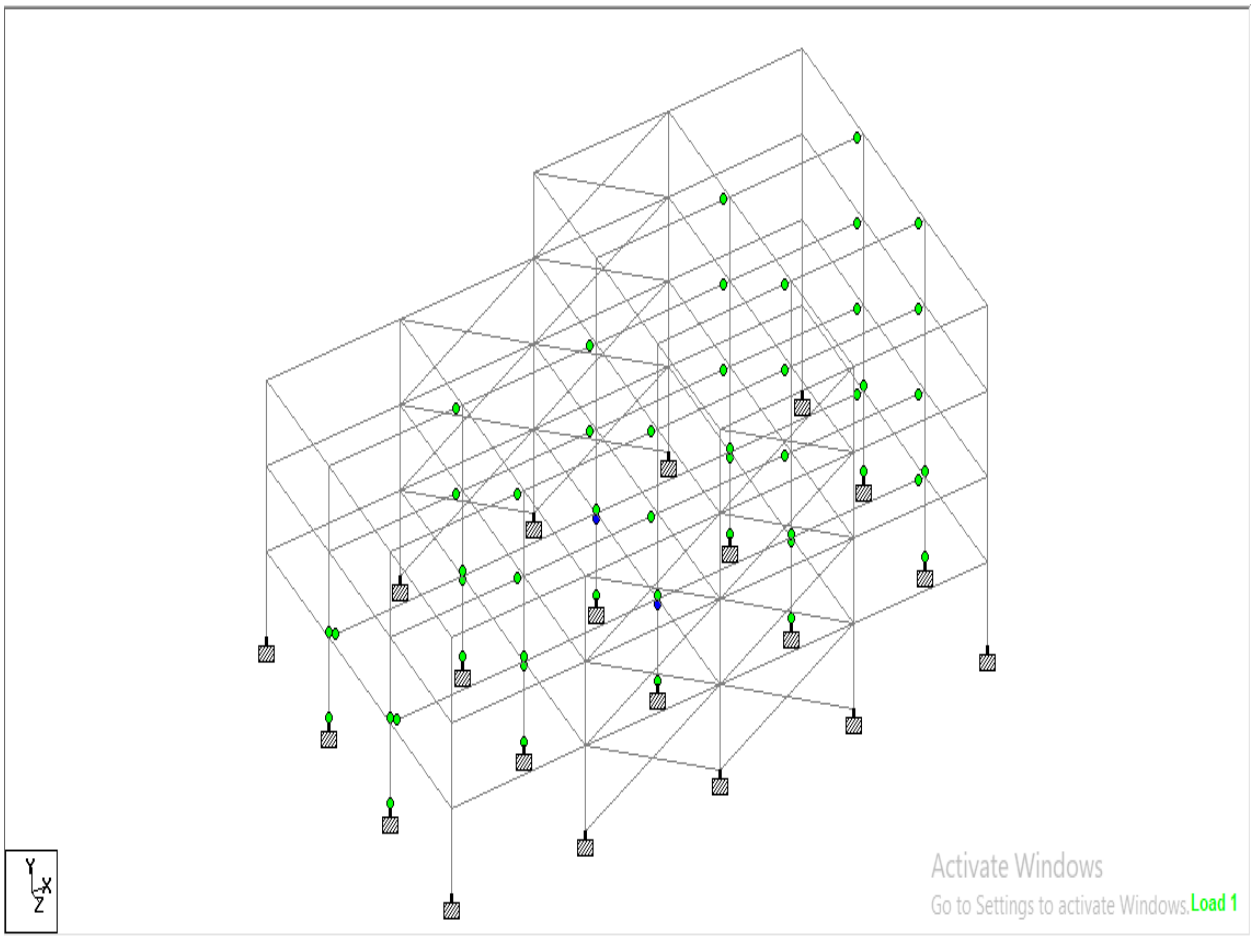

Fig 4. 18Members of Externally Braced Steel Frame in IO-LS

Table4.13 shows hinge formation status on load step 48 when base shear value is 5161.377KN.

Table 4. 13Hinge location Status when Base Shear is 5161.377KN

Beam	Status	Dir (Local)	Section ft	Status	Section ft	Status
1	Linear					
2	Nonlinear	Z			10	<= IO
3	Nonlinear	Z			10	<= IO
4-5	Linear					
6	Nonlinear	Z	0	<= IO	10	<= IO
7	Nonlinear	Z	0	<= IO	10	<= IO
8-9	Linear					

10	Nonlinear	Z	0	IO - LS	10	<= IO
11	Nonlinear	Z	0	IO - LS	10	<= IO
12-13	Linear					
14	Nonlinear	Z	0	<= IO	10	<= IO
15	Nonlinear	Z	0	<= IO	10	<= IO
16-17	Linear					
18	Nonlinear	Z			10	<= IO
19	Nonlinear	Z			10	<= IO
20-24	Linear					
25	Nonlinear	Z	0	<= IO		
26	Nonlinear	Z	0	<= IO		
27-45	Linear					
46	Nonlinear	Z			25	<= IO
47	Nonlinear	Z			25	<= IO
48-66	Linear					
67	Nonlinear	Z			10	<= IO
68	Nonlinear	Z			10	<= IO
69-70	Linear					
71	Nonlinear	Z			10	<= IO
72	Nonlinear	Z			10	<= IO
73-74	Linear					
75	Nonlinear	Z			10	<= IO
76	Nonlinear	Z			10	<= IO
77-78	Linear					

79	Nonlinear	Z			10	<= IO
80	Nonlinear	Z			10	<= IO
81-82	Linear					
83	Nonlinear	Z			10	<= IO
84	Nonlinear	Z			10	<= IO
85-99	Linear					
100	Nonlinear	Z			25	<= IO
101	Nonlinear	Z			25	<= IO
102	Linear					
117-120	Linear					
121	Nonlinear	Z			25	<= IO
122	Nonlinear	Z			25	<= IO
123-141	Linear					
142	Nonlinear	Z			25	<= IO
143	Nonlinear	Z			25	<= IO
144-162	Linear					
163	Nonlinear	Z			25	<= IO
164	Nonlinear	Z			25	<= IO
165-214	Linear					
215	Nonlinear	Z			25	<= IO
216	Nonlinear	Z			25	<= IO
217-235	Linear					
236	Nonlinear	Z			25	<= IO
237	Nonlinear	Z			25	<= IO

238-256	Linear					
257	Nonlinear	Z			25	<= IO
258	Nonlinear	Z			25	<= IO
259-277	Linear					
278	Nonlinear	Z			25	<= IO
279	Nonlinear	Z			25	<= IO
280-313	Linear					
314	Nonlinear	Z			25	<= IO
315	Nonlinear	Z			25	<= IO
316-334	Linear					
335	Nonlinear	Z			25	<= IO
336	Nonlinear	Z			25	<= IO
337-382	Linear					

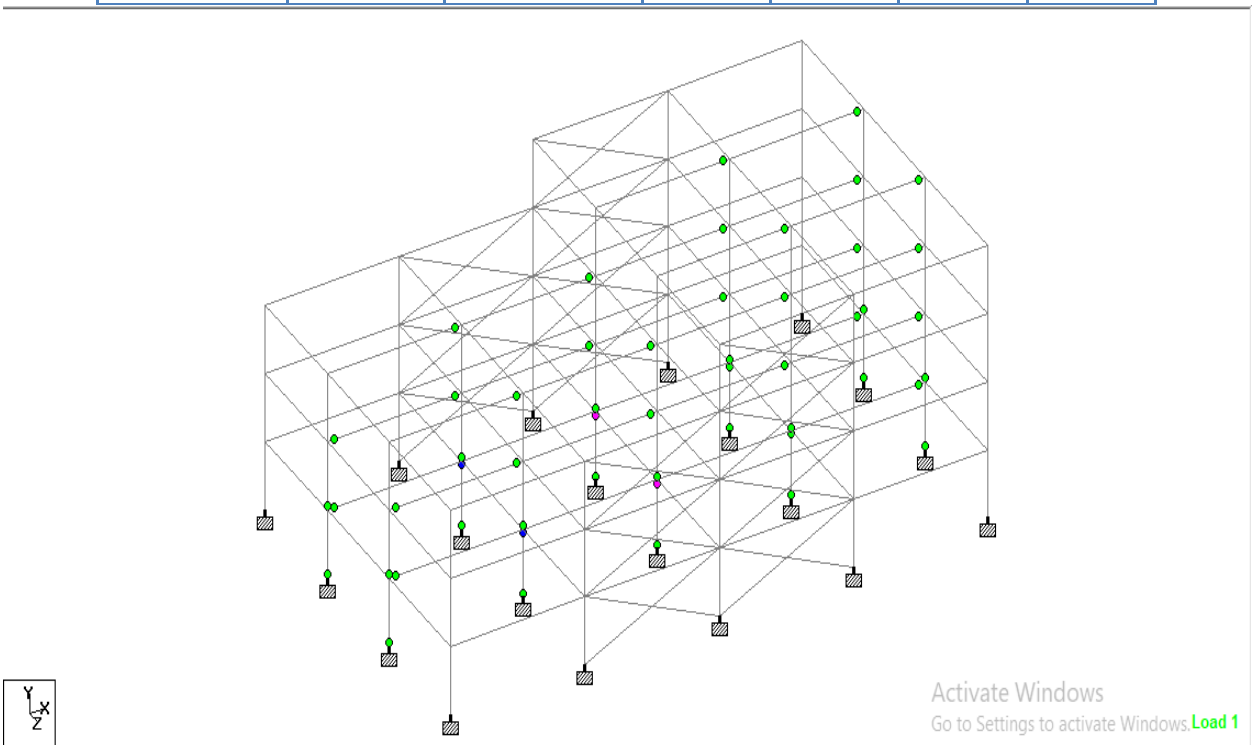

Fig 4. 19Members of Externally Braced Steel Frame in LS-CP

Table 4.14 shows plastic hinge location status of beams in the frame with external bracings when base shear redistributed and its value is 5391.19KN at load step: 63.

Table 4. 14Hinge Location Status when redistributed Base Shear is 5391.19KN

Beam	Status	Dir (Local)	Section ft	Status	Section ft	Status
1	Linear					
2	Nonlinear	Z			10	<= IO
3	Nonlinear	Z			10	<= IO
4-5	Linear					
5	Linear					
6	Nonlinear	Z	0	IO – LS	10	<= IO
7	Nonlinear	Z	0	IO – LS	10	<= IO
8-9	Linear					
10	Nonlinear	Z	0	LS – CP	10	<= IO
11	Nonlinear	Z	0	LS – CP	10	<= IO
12-13	Linear					
14	Nonlinear	Z	0	<= IO	10	<= IO
15	Nonlinear	Z	0	<= IO	10	<= IO
16-17	Linear					
18	Nonlinear	Z			10	<= IO
19	Nonlinear	Z			10	<= IO
20-24	Linear					
25	Nonlinear	Z	0	<= IO		
26	Nonlinear	Z	0	<= IO		
27-45	Linear					

46	Nonlinear	Z			25	<= IO
47	Nonlinear	Z			25	<= IO
48-66	Linear					
67	Nonlinear	Z			10	<= IO
68	Nonlinear	Z			10	<= IO
69-70	Linear					
71	Nonlinear	Z			10	<= IO
72	Nonlinear	Z			10	<= IO
73-74	Linear					
75	Nonlinear	Z			10	<= IO
76	Nonlinear	Z			10	<= IO
77-78	Linear					
79	Nonlinear	Z			10	<= IO
80	Nonlinear	Z			10	<= IO
81-82	Linear					
83	Nonlinear	Z			10	<= IO
84	Nonlinear	Z			10	<= IO
85-99	Linear					
100	Nonlinear	Z	0	<= IO	25	<= IO
101	Nonlinear	Z	0	<= IO	25	<= IO
102-120	Linear					
121	Nonlinear	Z			25	<= IO
122	Nonlinear	Z			25	<= IO

123-141	Linear					
142	Nonlinear	Z			25	<= IO
143	Nonlinear	Z			25	<= IO
144-162	Linear					
163	Nonlinear	Z			25	<= IO
164	Nonlinear	Z			25	<= IO
165-214	Linear					
215	Nonlinear	Z			25	<= IO
216	Nonlinear	Z			25	<= IO
217-235	Linear					
236	Nonlinear	Z			25	<= IO
237	Nonlinear	Z			25	<= IO
238-256	Linear					
257	Nonlinear	Z			25	<= IO
258	Nonlinear	Z			25	<= IO
259	Linear					
274-277	Linear					
278	Nonlinear	Z			25	<= IO
279	Nonlinear	Z			25	<= IO

280-313	Linear					
314	Nonlinear	Z			25	<= IO
315	Nonlinear	Z			25	<= IO
316-334	Linear					
335	Nonlinear	Z			25	<= IO
336	Nonlinear	Z			25	<= IO
337-382	Linear					

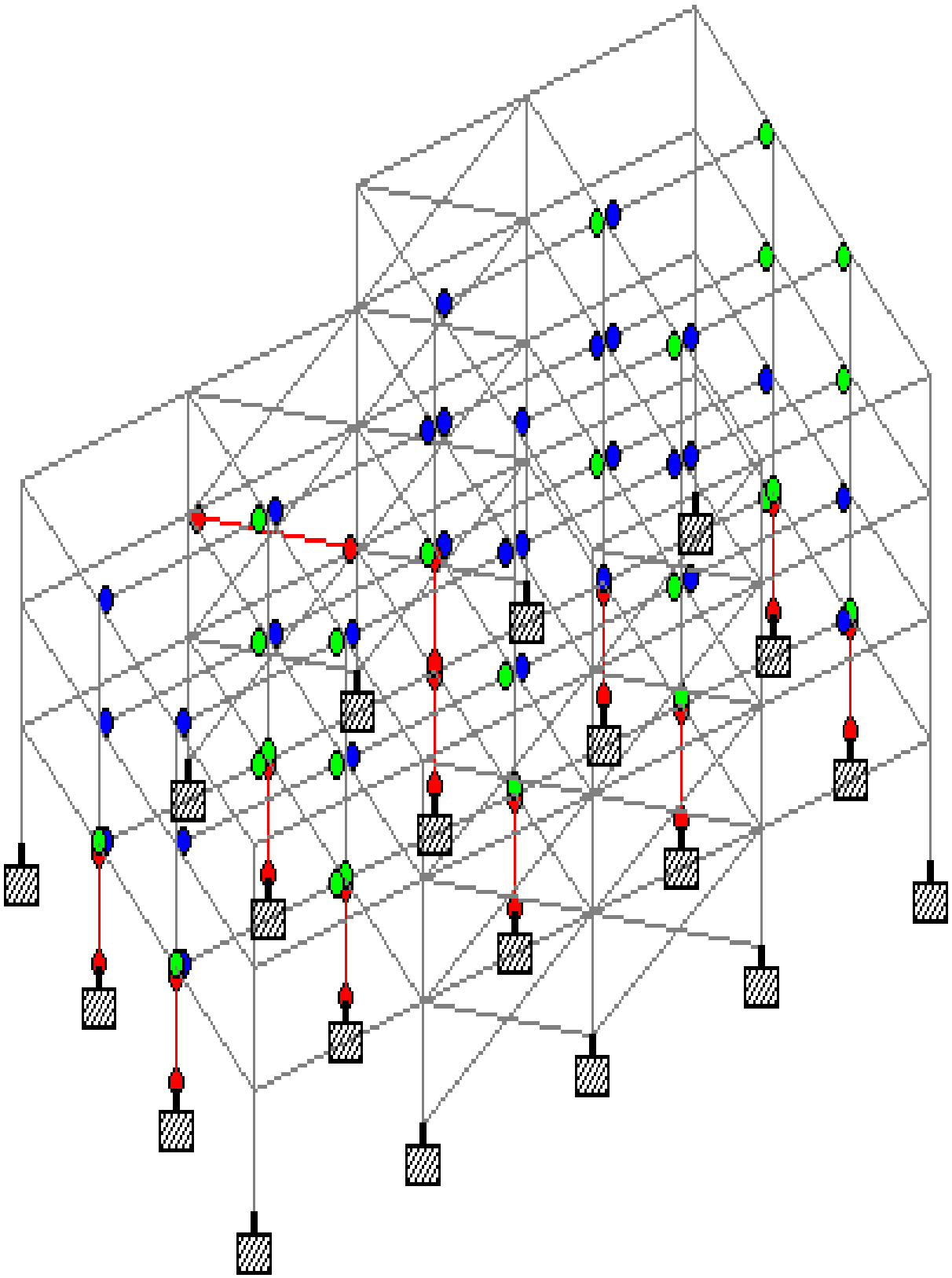

Fig 4. 20Members of Externally Braced Steel Frame Failed in Pushover Analysis

At the load step:231 base shear applied is 6039.118KN and displacement recorded by software is 1202.272mm as shown in below Fig: 4.21

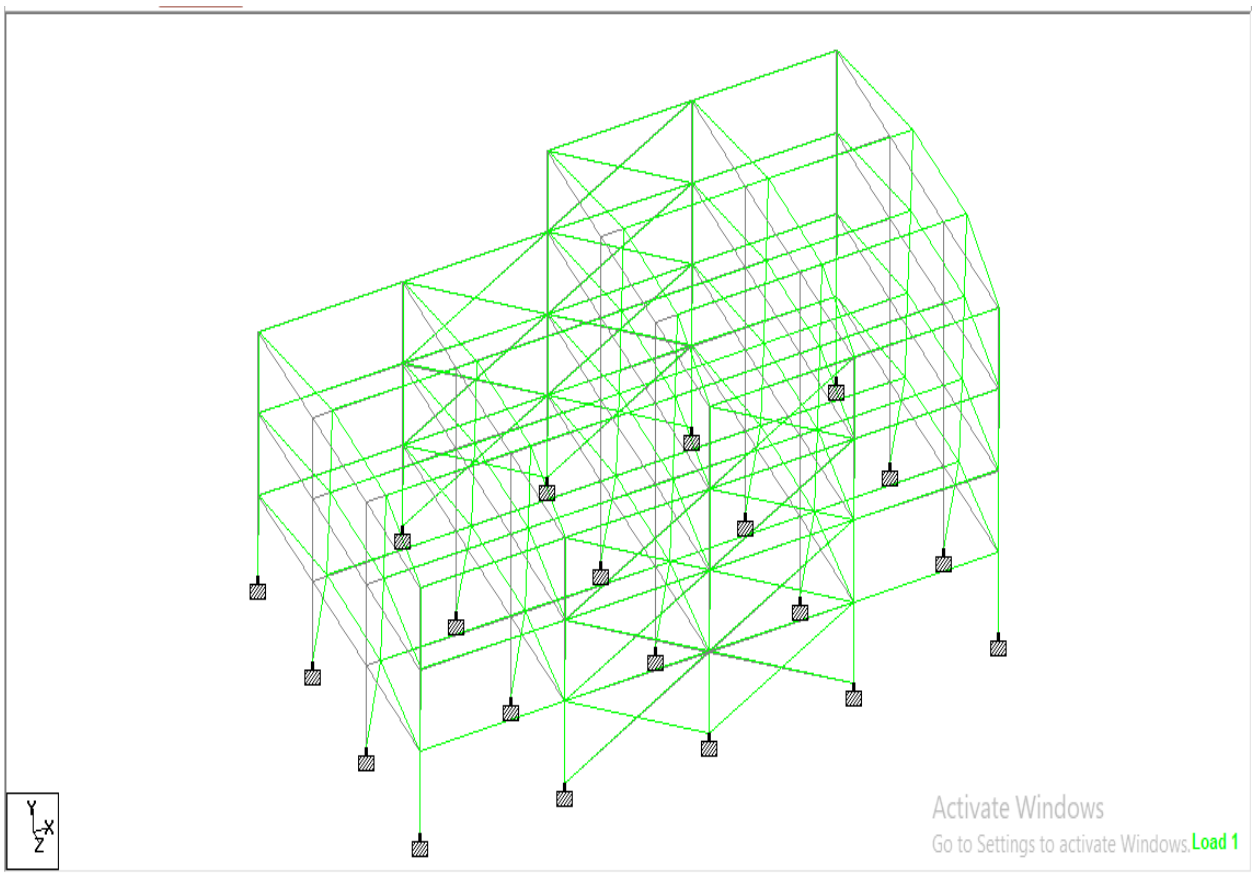

Fig 4. 21Displacement in Externally Braced Steel Frame when Base Shear is 6039.118KN

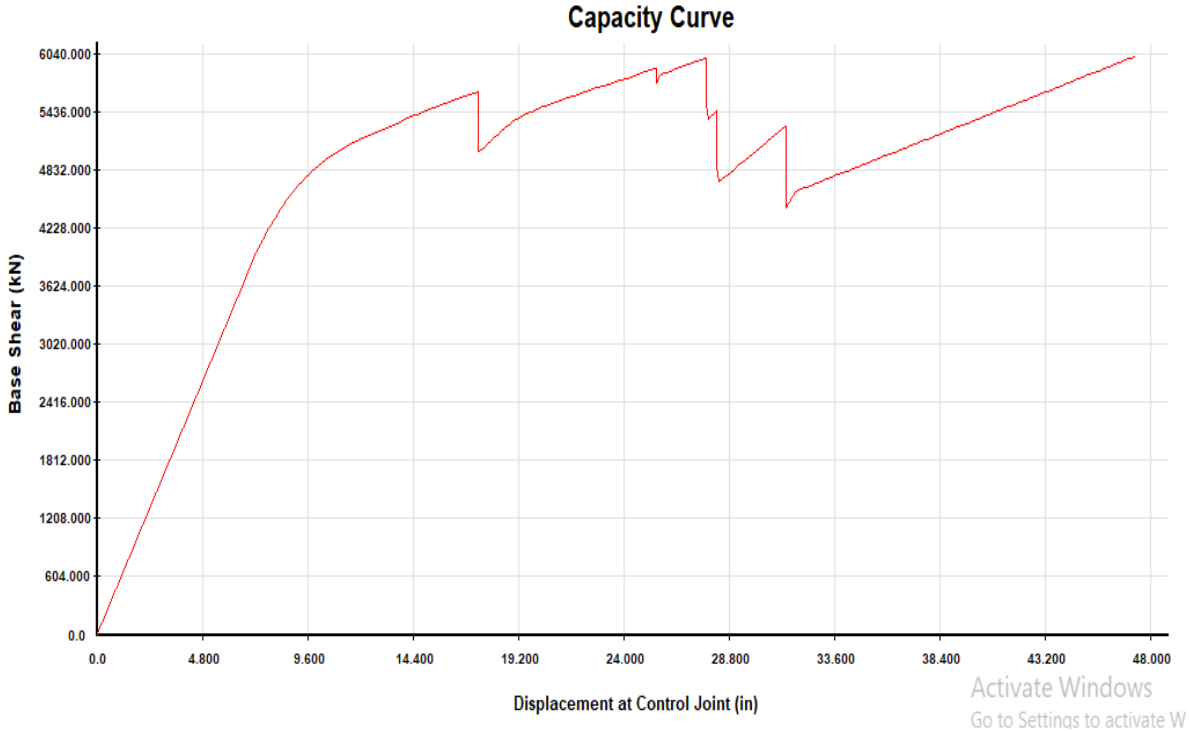

Fig 4. 22Capacity Curve for Externally Braced Steel Frame

Table 4.15Shows the displacement obsered during respective load step and base shear in externally braced 3D steel frame.

Table 4. 15Displacement and Base Shear.

Load Step (%s)	Displacement mm	Base Shear kip
1	0	0
2	0.712	3.485
3	6.325	30.958
4	178.265	872.228
5	181.325	886.05
6	183.8	896.277
7	186.432	906.424
8	189.144	916.879
9	191.856	927.334
10	194.568	937.789
11	196.455	944.758
12	199.35	954.928
13	202.361	965.383
14	203.395	968.757
15	206.572	979.085
16	209.787	989.54
17	213.002	999.995
18	216.217	1010.45
19	217.335	1013.935
20	219.577	1020.765

21	220.804	1024.123
22	223.354	1030.942
23	225.969	1037.764
24	227.369	1041.249
25	230.113	1048.061
26	232.92	1055.031
27	234.395	1058.516
28	235.876	1061.844
29	238.915	1068.651
30	242.114	1075.621
31	245.324	1082.404
32	248.623	1089.374
33	252.25	1096.344
34	256.2	1102.709
35	260.537	1109.222
36	265.179	1116.192
37	267.741	1119.677
38	272.686	1126.257
39	275.305	1129.742
40	277.925	1133.227
41	280.544	1136.712
42	283.163	1140.197
43	285.782	1143.682
44	288.461	1147.167
45	291.4	1150.575

46	294.126	1153.692
47	297.417	1157.129
48	300.489	1160.324
49	304.42	1163.794
50	307.774	1166.754
51	311.722	1170.239
52	315.67	1173.724
53	319.619	1177.209
54	323.447	1180.694
55	327.397	1184.288
56	331.226	1187.77
57	335.274	1191.255
58	339.116	1194.563
59	343.165	1198.048
60	347.213	1201.533
61	351.261	1205.018
62	355.31	1208.503
63	359.471	1211.988
64	363.522	1215.38
65	368.092	1218.865
66	372.262	1222.045
67	376.831	1225.53
68	381.401	1229.015
69	385.79	1232.5
70	390.352	1236.122

71	394.741	1239.607
72	399.131	1243.092
73	403.52	1246.577
74	408.07	1250.062
75	412.463	1253.427
76	417.21	1256.912
77	422.013	1260.256
78	426.767	1263.565
79	431.779	1267.05
80	436.781	1270.528
81	441.794	1274.013
82	441.794	1136.805
83	445.325	1137.671
84	448.882	1144.801
85	452.405	1151.865
86	455.896	1158.863
87	459.356	1165.799
88	461.215	1169.25
89	465.062	1176.368
90	468.87	1183.416
91	471.7	1188.652
92	474.648	1193.879
93	477.308	1198.236
94	480.216	1202.592
95	483.189	1206.948

96	485.905	1210.433
97	489.03	1213.918
98	492.233	1217.403
99	495.667	1220.888
100	498.392	1223.502
101	501.193	1226.116
102	504.113	1228.729
103	507.033	1231.343
104	510.043	1233.957
105	513.181	1236.571
106	516.419	1239.184
107	519.71	1241.798
108	523.188	1244.412
109	526.74	1247.025
110	536.319	1253.899
111	544.685	1259.88
112	553.022	1265.84
113	561.329	1271.78
114	569.858	1277.698
115	578.75	1283.593
116	587.574	1289.459
117	596.352	1295.295
118	605.086	1301.101
119	613.776	1306.877
120	622.422	1312.626

121	631.026	1318.345
122	639.588	1324.037
123	648.108	1329.701
124	648.108	1293.42
125	651.236	1312.289
126	653.98	1314.902
127	657.233	1317.516
128	660.699	1320.13
129	664.165	1322.744
130	667.632	1325.357
131	671.098	1327.971
132	675.745	1331.427
133	680.385	1334.878
134	685.188	1338.445
135	689.948	1341.979
136	694.666	1345.482
137	699.344	1348.955
138	705.099	1353.016
139	705.099	1244.291
140	708.238	1210.373
141	711.4	1217.412
142	714.548	1224.421
143	717.684	1231.403
144	717.684	1096.859
145	720.32	1063.002

146	724.74	1070.543
147	729.132	1078.035
148	733.496	1085.48
149	737.832	1092.879
150	742.142	1100.232
151	746.426	1107.54
152	750.683	1114.805
153	754.916	1122.026
154	759.123	1129.204
155	763.306	1136.341
156	767.466	1143.437
157	771.601	1150.493
158	775.713	1157.509
159	779.803	1164.486
160	783.87	1171.425
161	787.949	1178.359
162	792.373	1185.28
163	795.054	1188.734
164	797.979	1192.204
165	797.979	1003.914
166	808.968	1040.845
167	815.015	1045.716
168	821.062	1050.587
169	827.11	1055.458
170	833.157	1060.329

171	839.205	1065.2
172	845.252	1070.072
173	851.3	1074.943
174	857.348	1079.815
175	863.396	1084.686
176	869.444	1089.558
177	875.493	1094.43
178	881.541	1099.302
179	887.59	1104.174
180	893.638	1109.046
181	899.687	1113.918
182	905.736	1118.791
183	911.785	1123.663
184	917.834	1128.535
185	923.883	1133.408
186	929.932	1138.281
187	935.982	1143.153
188	942.031	1148.026
189	948.081	1152.899
190	954.131	1157.772
191	960.181	1162.645
192	966.231	1167.519
193	972.281	1172.392
194	978.331	1177.265
195	984.381	1182.139

196	990.432	1187.012
197	996.483	1191.886
198	1002.533	1196.76
199	1008.584	1201.634
200	1014.635	1206.508
201	1020.686	1211.382
202	1026.737	1216.256
203	1032.789	1221.13
204	1038.84	1226.005
205	1044.892	1230.879
206	1050.943	1235.754
207	1056.995	1240.628
208	1063.047	1245.503
209	1069.099	1250.378
210	1075.151	1255.253
211	1081.203	1260.128
212	1087.256	1265.003
213	1093.308	1269.878
214	1099.361	1274.753
215	1105.413	1279.629
216	1111.466	1284.504
217	1117.519	1289.38
218	1123.572	1294.256
219	1129.625	1299.131
220	1135.679	1304.007

221	1141.732	1308.883
222	1147.786	1313.759
223	1153.839	1318.635
224	1159.893	1323.511
225	1165.947	1328.388
226	1172.001	1333.264
227	1178.055	1338.141
228	1184.109	1343.017
229	1190.163	1347.894
230	1196.218	1352.771
231	1202.272	1357.648

C.Steel Frame with Optimum Bracing

After the results of above two frames third frame is designed in such way that internal bracings were provided at position to avoid the failure of members observed in first and second frame case. For that purpose different position of the bracing tried and the frame represented in this paper with the optimal position of bracing is with the most accurate collapse prevention results. Column 5,8,912,13 and 16 in G+3 internally braced steel frame is in IO performance level ate base shear 3536KN as shown in fig 60. Column 27 and 31reched the IO-LS performance level when base shear is 4517.66 KN as shown in fig 4.24. Column 10 and 11 as shown in fig 4.26 are I LS-CP level when base shear 5128.46KN. Same columns reached CP level first in entire structure at base shear 5222.86KN. In this design, it is observed that base shear carrying capacity of structure is increased but displacement of structure is less as compare to externally braced frame. Hence structure prevented from collapse. After completing all push load step it is observed that no member failed only column 10 and 11 are in CP level but structure is safe on remaining columns. Capacity curve is as shown in fig 4.27

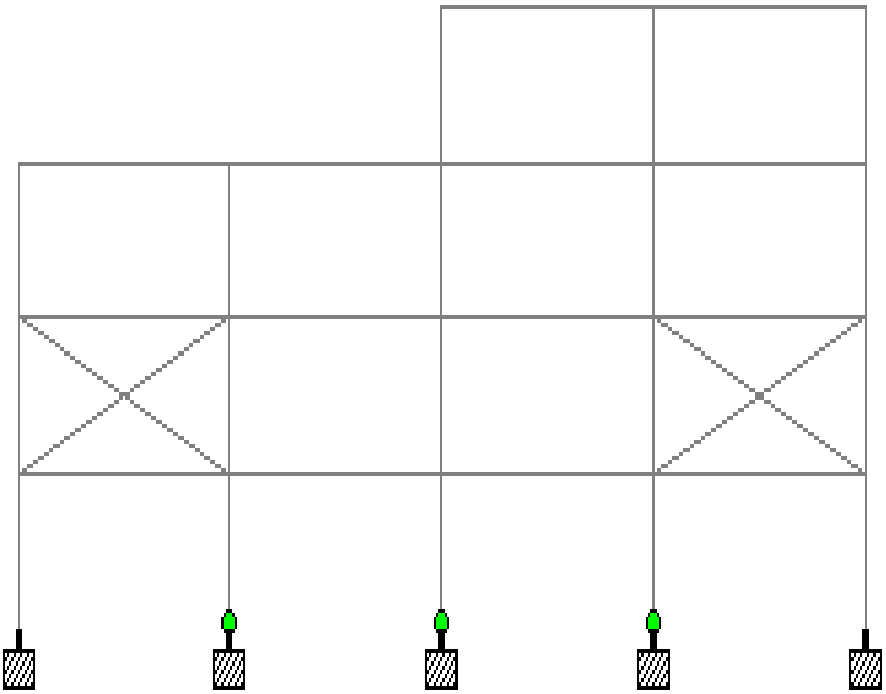

Fig 4. 23Members of Internally Braced Steel Frame in IO

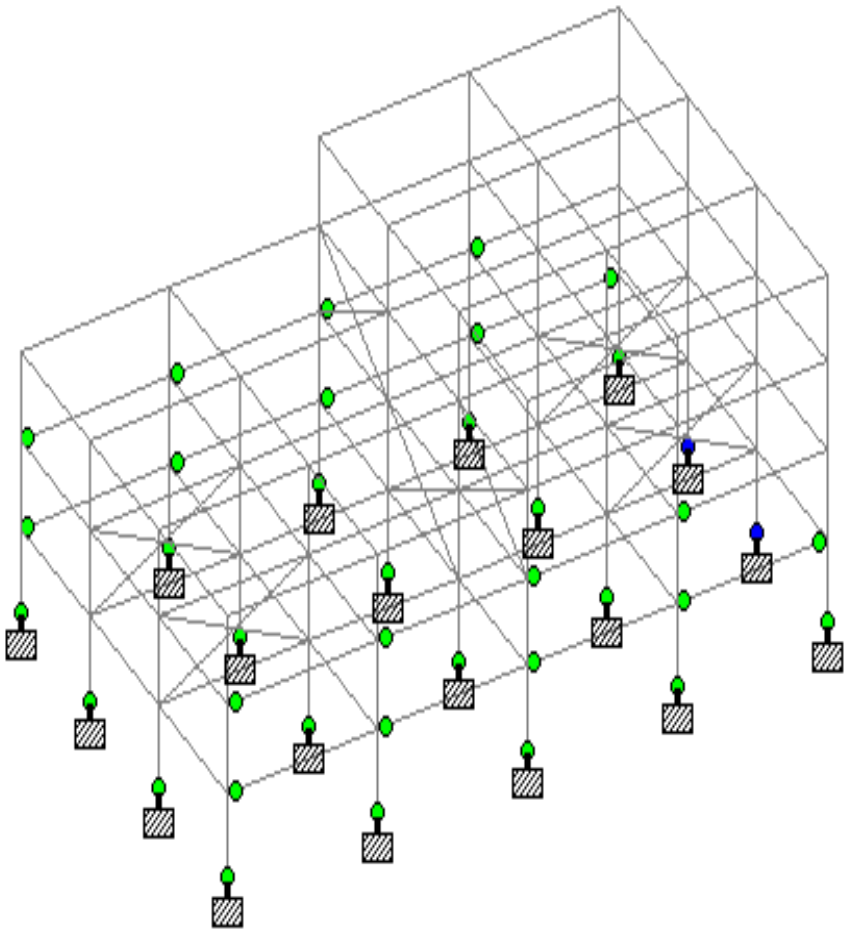

Fig 4. 24Members of Externally Braced Steel Frame in IO-LS

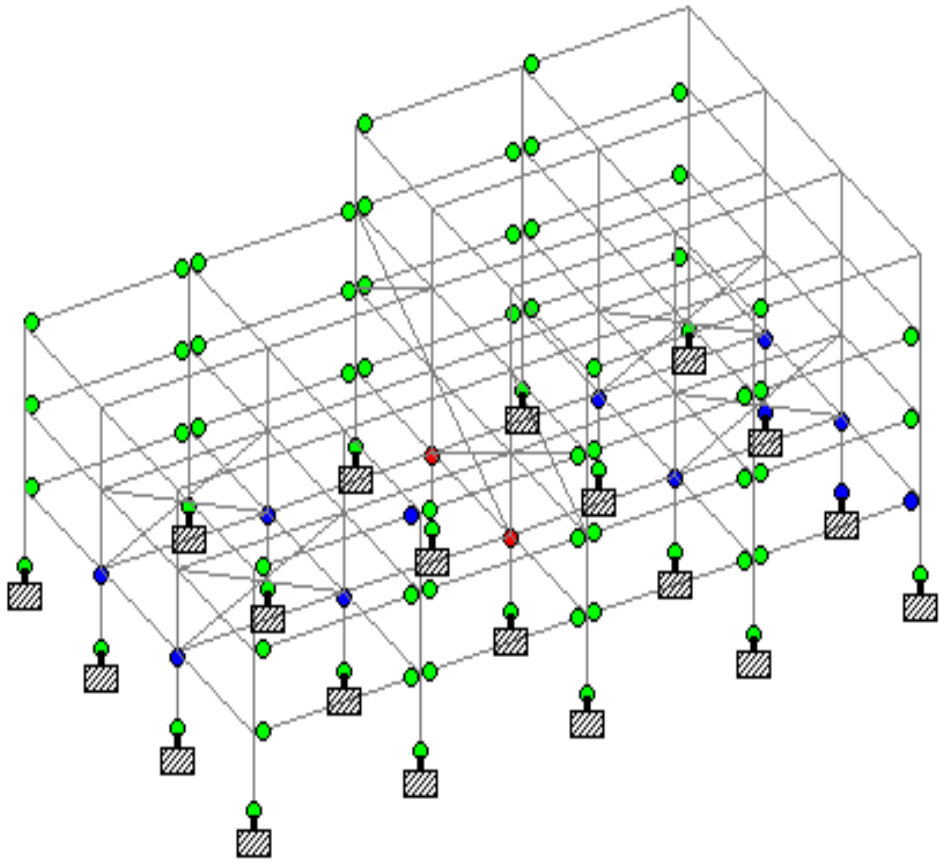

Fig 4. 25Members of Externally Braced Steel Frame in LS-CP Performance Level

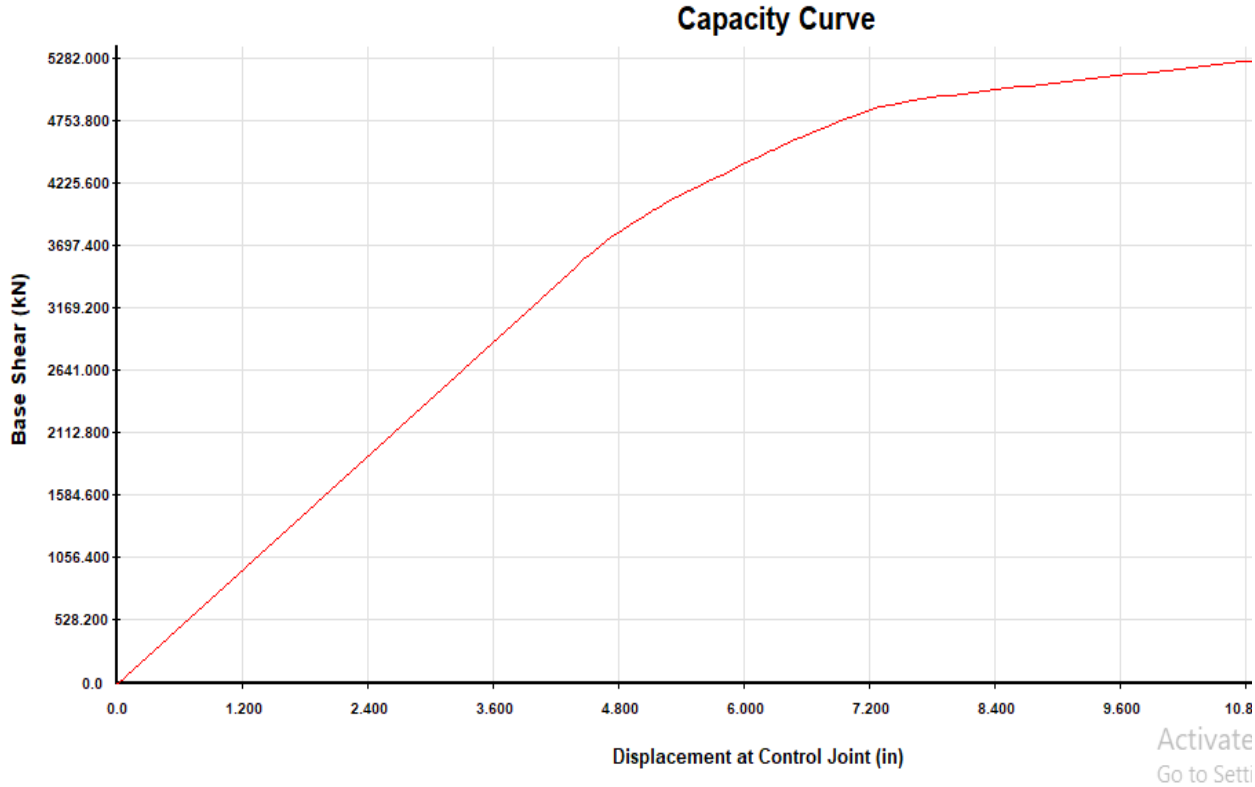

Fig 4. 26Capacity Curve for Externally Braced Steel Frame

CHAPTER 5

CONCLUSION

This thesis presented and documented performance based seismic analysis for steel frames. The concept of performance based seismic design was successfully implemented by nonlinear static analysis by applying incremental lateral loads on braced and non braced steel frames. The performance criteria suggested by FEMA 356 can be successfully implemented in PBSD pushover analysis method by using STAAD Pro. Advanced. Maximum members of moment frame reaches to Collapse prevention level and ultimately fails under the incremental push loads. This leads the collapse of entire steel frame during the earthquake. The Shear capacity of the structure can be increased by introducing external steel bracings in the structural system. But under the incremental lateral loads bracing also fail. This leads to the maximum members to be in CP level and causes failure of structural members during earthquake. To avoid this position of the bracing can be optimized by using pushover analysis by identifying which members are failing after incremental lateral load and identifying the position of bracing which prevents the failure of these members. Such optimal position of bracing saves the structure during earthquake. It is concluded in this research that such braced steel frame at optimal position increases the shear capacity of structure and performs well, maximum in LS level. No collapse of member is observed in this frame after incremental lateral loads. Pushover analysis is successfully implemented to study non linear behavior of structure under earthquake loading.

CHAPTER 6

REFERENCES

1. J. Ramon Gaxiola-Camacho, AchintyaHaldar, Dist.M.ASCE, HamoonAzizsoltani, Federico Valenzuela-Beltran, and Alfredo Reyes-Salazar, "Performance-Based Seismic Design of Steel Buildings Using Rigidities of Connections,"ASCE-ASMEJ Risk Uncertainty Eng. Syst. Part A Civ Eng.2018, 4910:04017036.
2. Ahmed Ghobarah, "Performance Based Design in Earthquake Engineering: State of Development," *ELSEVIER,* Engineering Structures 23 (2001) 878–884.
3. SEAOC. Vision 2000, "Performance based seismic engineering of buildings," vols. I and II: Conceptual Framework. Sacramento (CA): Structural Engineers Association of California, 1995.
4. FEMA 273, "NEHRP guidelines for the seismic rehabilitation of buildings; FEMA 274, Commentry," Washington (DC): Federal Emergency Management Agency, 1996.
5. Anusha K and Raghu K, "Analysis of Braced Frame Multi Storied Structure with Different Angles as Per Indian Standards," *IRJET;* Volume: 05 Issue: 05 | May-2018, p-ISSN: 2395-0072.
6. Ali Mehrabian, Tarig Ali and AchintyaHaldar, "Nonlinear Analysis of Steel Frame," *ELSEVIER 2008,* DOI: 10.1016/j.na.2008.11.092.
7. FEMA (2000a), "Recommended seismic design criteria for new steel moment-frame buildings," FEMA350,Washington (DC): Federal Emergency Management Agency.
8. FEMA 356, "Prestandard and Commentary for the Seismic Rehabilitation of Building," Washington (DC): Federal Emergency Management Agency.
9. C.V.R. Murty, RupenGoswami, A.R.Vijaynarayan and Vipul Mehta, "Some concepts in Earthquake behavior of building," Gujrat State Disaster Management Authority, Government of Gujrat.
10. Anusha K and Raghu K, "Analysis of Braced Frame Multi Storied Structure with Different Angles as Per Indian Standards," *IRJRT*, e-ISSN: 2395-0056, p-ISSN: 2395-0072, Volume -5, Issue: 5 May 2018.
11. Dakeshes J. Pabhar, "Performance Based Pushover Analysis of R.C.C. Frames," *International Journal of Advanced Engineering Research and Studies*, E-ISSN2249-8974, Volume-I, Issue-III, April-June 2012.
12. KalavguntaSreedhar, "Pushover Analysis of Steel Structure using STAAD Pro," Bentley Systems, 17 June 2012.
13. Vijay Krishna Kotapati and S. Choudhary, "A Study on Performance of Steel Buildings," *IJRSI*, ISSN 2321-2705, Volume – I, Issue VIII, ICMRP-2014.
14. O.Alsharmrani and G.G. Schiele, "Optimal bracing type and position to minimize lateral drift in high rise building," WIT Trasactions on The Built Environment, ISSN 1743-3509, Volume-106, 2009
15. Akbas, B., Kara, F.I., and Tugsal, U.M. (2007), "Comparison of Pushover Analysis and Nonlinear Dynamic Time History Analysis on Low-, Medium-, and High-Rise Steel Frames", Project No. 02-A-02-01-03, Scientific Research ProjectFund, Gebze Institute of Technology
16. Applied Technology Council, ATC-40. Seismic evaluation and retrofit of concrete Buildings, California, 1996; Vols. 1 and 2.
17. American Institute of Steel Construction Inc.– Steel Construction Manual (13th Edition)
18. AS 4100 ; 1998 – Australian Code for Design of Steel Structures
19. Bandyopadhyay T K and GuhaArijit, "Steel Structures" – Seminar on Revision of National Building Code(NBC) organized by Indian Institute of Engineers, Delhi Centre, 2002.
20. Bandyopadhyay T K and GuhaArijit, "Code Stipulations – Indian & International Codes and Revision of IS800" – Course at S V University College of Engineering, Tirupati, 2003
21. Bandyopadhyay T K and GuhaArijit, (2004), "Structural Member Design Based on Draft IS: 800 (Limit States Method)" - published in INSDAG journal, Steel In Construction

22. Bandyopadhyay T K and GuhaArijit, (2005), "Structural Member Design Based on Draft IS: 800 (Limit StatesMethod), Members subjected to Combined Bending and Axial Forces" - published in INSDAG journal, Steel In Construction
23. Chopra AK, Goel RK (2001), "A modal pushover analysis procedure to estimate seismic Demands for buildings: Theory and preliminary evaluation", Pacific Earthquake Engineering Research Centre, University of California, Berkeley.
24. Duggal.S.K. „Limit State Design of Steel Structrues,Tata McGraw Hill Education
25. Federal Emergency Management Agency (FEMA),(1997).NEHRP provisions for the seismic rehabilitation of buildings. Rep FEMA 273 and 274. Washington, DC: FEMA.
26. IS 1893 Part 1 (2002),"Indian Standard Criteria for Earthquake Resistant Design of Structures", Bureau of Indian Standards, New Delhi
27. IS: 800 (1984), General Construction in Steel – Code of Practice, Bureau of Indian Standards, New Delhi, 2007.
28. IS: 800 (2007), General Construction in Steel – Code of Practice, Bureau of Indian Standards, New Delhi, 2007

APPENDICES

2D Moment Resisting Frame

****
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* Version 22.04.00.40 *
* Proprietary Program of *
* Bentley Systems, Inc. *
* Date= MAY 21, 2020 *
* Time= 15:46:58 *
* *
* Licensed to: Shri Vithal Education & Research *
****

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2. START JOB INFORMATION
3. ENGINEER DATE 07-OCT-05
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT INCHES KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 118.11 0; 3 118.11 118.11 0; 4 118.11 0 0; 5 0 236.22 0
9. 6 118.11 236.22 0; 7 0 354.331 0; 8 118.11 354.331 0; 9 0 472.441 0
10. 10 118.11 472.441 0; 11 236.22 118.11 0; 12 236.22 0 0; 13 236.22 236.22 0
11. 14 236.22 354.331 0; 15 236.22 472.441 0
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13. 1 1 2; 2 2 3; 3 3 4; 4 2 5; 5 5 6; 6 6 3; 7 5 7; 8 7 8; 9 8 6; 10 7 9; 11 9 10
14. 12 10 8; 13 3 11; 14 6 13; 15 8 14; 16 10 15; 17 11 12; 18 13 11; 19 14 13
15. 20 15 14
16. DEFINE MATERIAL START
17. ISOTROPIC STEEL
18. E 29732.7
19. POISSON 0.3
20. DENSITY 0.000283
21. ALPHA 1.2E-05
22. DAMP 0.03
23. END DEFINE MATERIAL
24. MEMBER PROPERTY INDIAN

25. 1 3 4 6 7 9 10 12 17 TO 20 TABLE ST ISHB450
26. 2 5 8 11 13 TO 16 TABLE ST ISHB225
27. CONSTANTS
28. MATERIAL STEEL ALL
29. SUPPORTS
30. 1 4 12 FIXED
31. DEFINE PUSHOVER DATA
32. FRAME 2
33. GNONL 1
34. SAVE LOADSTEP RESULT DISP 0.010000
35. FYE 36.000000 ALL
36. LDSTEP 500
37. SPECTRUM PARAMETERS
38. DAMPING 5.000039. SC 1
40. SS 1
41. S1 1
42. DISP X 5 JOINT 15
43. HINGE FEMA ALL
44. VDB 3
45. END PUSHOVER DATA
***WARNING: BASE SHEAR TO BE DISTRIBUTED IS NOT DEFINED.
10% OF GRAVITY LOAD IS DISTRIBUTED AS LATERAL LOAD.
46. LOAD 1 LOADTYPE GRAVITY
47. SELFWEIGHT Y -1
48. MEMBER LOAD
49. 2 5 8 11 13 TO 16 UNI GY -0.6
50. PERFORM PUSHOVER ANALYSIS
P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS 15 NUMBER OF MEMBERS 20
NUMBER OF PLATES 0 NUMBER OF SOLIDS 0
NUMBER OF SURFACES 0 NUMBER OF SUPPORTS 3
Using 64-bit analysis engine.
SOLVER USED IS THE IN-CORE ADVANCED MATH SOLVER
TOTAL PRIMARY LOAD CASES = 1, TOTAL DEGREES OF FREEDOM = 72
TOTAL LOAD COMBINATION CASES = 0 SO FAR.
*** WARNING:
Pivoting Applied for Small or Zero Pivots. Solution Successfully Completed.
EIGEN METHOD : SUBSPACE

NUMBER OF MODES REQUESTED = 6
NUMBER OF EXISTING MASSES IN THE MODEL = 36
NUMBER OF MODES THAT WILL BE USED = 6
*** EIGENSOLUTION: ADVANCED METHOD ***
3D Concentric Braced Frames
****
* *
* STAAD.Pro CONNECT Edition *
* Version 22.04.00.40 *
* Proprietary Program of *
* Bentley Systems, Inc. *
* Date= JUN 4, 2020 *
* Time= 16:10:46 *
* *
* Licensed to: Shri Vithal Education & Research *
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11. 15 75 0 40; 16 75 0 60; 17 100 0 0; 18 100 0 20; 19 100 0 40; 20 100 0 60
12. 21 0 10 0; 22 0 10 20; 23 0 10 40; 24 0 10 60; 25 25 10 0; 26 25 10 20
13. 27 25 10 40; 28 25 10 60; 29 50 10 0; 30 50 10 20; 31 50 10 40; 32 50 10 60
14. 33 75 10 0; 34 75 10 20; 35 75 10 40; 36 75 10 60; 37 100 10 0; 38 100 10 20
15. 39 100 10 40; 40 100 10 60; 50 0 20 0; 51 0 20 20; 52 0 20 40; 53 0 20 60
16. 62 25 20 0; 63 25 20 20; 64 25 20 40; 65 25 20 60; 74 50 20 0; 75 50 20 20
17. 76 50 20 40; 77 50 20 60; 86 75 20 0; 87 75 20 20; 88 75 20 40; 89 75 20 60
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19. 105 0 30 20; 106 0 30 40; 107 0 30 60; 116 25 30 0; 117 25 30 20; 118 25 30 40
20. 119 25 30 60; 128 50 30 0; 129 50 30 20; 130 50 30 40; 131 50 30 60
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22. 153 100 30 20; 154 100 30 40; 155 100 30 60; 156 50 40 0; 157 50 40 20
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24. 171 75 40 60; 180 100 40 0; 181 100 40 20; 182 100 40 40; 183 100 40 60
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70. 1 4 5 8 10 11 13 16 TO 20 66 69 70 73 TO 78 81 TO 85 187 190 191 194 TO 199 -
71. 202 TO 206 298 TO 302 305 TO 309 TABLE ST ISHB350H
72. 9 12 TABLE ST ISLB550
73. CONSTANTS
74. MATERIAL STEEL ALL
75. SUPPORTS
76. 1 TO 20 FIXED
77. UNIT METER KN
78. DEFINE PUSHOVER DATA
79. FRAME 2
80. GNONL 0
81. LDSTEP 250
82. SPECTRUM PARAMETERS
83. DAMPING 5.0000
84. SC 4
85. SS 1
86. S1 1
87. DISP X 1.2 JOINT 158
88. END PUSHOVER DATA
***WARNING: BASE SHEAR TO BE DISTRIBUTED IS NOT DEFINED.
10% OF GRAVITY LOAD IS DISTRIBUTED AS LATERAL LOAD.
89. UNIT FEET KIP
90. LOAD 1 LOADTYPE GRAVITY TITLE LOAD CASE 1
91. SELFWEIGHT Y -1
92. UNIT METER KN
93. MEMBER LOAD
94. 21 TO 51 96 TO 102 117 TO 123 138 TO 144 159 TO 165 180 TO 182 211 TO 217 -
95. 232 TO 238 253 TO 259 274 TO 280 295 TO 297 310 TO 316 331 TO 337 -
96. 352 TO 354 UNI GY -3
97. UNIT FEET KIP
98. PERFORM PUSHOVER ANALYSIS
P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS 92 NUMBER OF MEMBERS 182

NUMBER OF PLATES 0 NUMBER OF SOLIDS 0
NUMBER OF SURFACES 0 NUMBER OF SUPPORTS 20
Using 64-bit analysis engine.
SOLVER USED IS THE IN-CORE ADVANCED MATH SOLVER
TOTAL PRIMARY LOAD CASES = 1, TOTAL DEGREES OF FREEDOM = 432
TOTAL LOAD COMBINATION CASES = 0 SO FAR.
EIGEN METHOD : SUBSPACE

NUMBER OF MODES REQUESTED = 6
NUMBER OF EXISTING MASSES IN THE MODEL = 216
NUMBER OF MODES THAT WILL BE USED = 6
*** EIGENSOLUTION: ADVANCED METHOD ***
CALCULATED FREQUENCIES FOR LOAD CASE 2
MODE FREQUENCY(CYCLES/SEC) PERIOD(SEC)
1 0.090 11.07621
2 0.109 9.14968
3 0.569 1.75597
4 0.674 1.48366
5 0.783 1.27775
6 0.984 1.01669
MODAL WEIGHT (MODAL MASS TIMES g) IN KIP GENERALIZED
MODE X Y Z WEIGHT
1 0.000000E+00 0.000000E+00 4.004865E+02 2.189960E+02
2 0.000000E+00 0.000000E+00 1.033348E-11 1.108830E+02
3 0.000000E+00 0.000000E+00 1.196171E+02 2.445621E+02
4 0.000000E+00 0.000000E+00 2.713379E-12 1.506619E+02
5 4.519506E+02 3.022909E-16 5.910363E-47 2.644991E+02
6 2.889758E-34 6.598964E-51 7.152078E-03 2.250205E+02
MASS PARTICIPATION FACTORS
MASS PARTICIPATION FACTORS IN PERCENT

MODE X Y Z SUMM-X SUMM-Y SUMM-Z
1 0.00 0.00 69.62 0.000 0.000 69.621
2 0.00 0.00 0.00 0.000 0.000 69.621
3 0.00 0.00 20.79 0.000 0.000 90.415
4 0.00 0.00 0.00 0.000 0.000 90.415
5 78.57 0.00 0.00 78.567 0.000 90.415
6 0.00 0.00 0.00 78.567 0.000 90.416
***WARNING: MEMBER # 3 HAS FAILED IN " FORCE-CONTROLLED ACTION
WHERE INTERACTION RATIO EXCEEDS 1.0.

**WARNING : THE DISPLACEMENT AT JOINT 15 EXCEEDS THE SPECIFIED DISPLACEMENT.

51. FINISH

********** END OF THE STAAD.Pro RUN **********

**** DATE= MAY 21,2020 TIME= 15:47: 8 ****

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* For technical assistance on STAAD.Pro, please visit *

* http://www.bentley.com/en/support/ *

* *

* Details about additional assistance from *

* Bentley and Partners can be found at program menu *

* Help->Technical Support *

* *

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* http://www.bentley.com *

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