

Dr. J.J.Magdum Trust's

Dr.J.J.Magdum College of Engineering, Jaysingpur

STUDENTS INFORMARTION MANUAL
B.Tech (2022-23)(Sem-I)



Department of Mechanical Engineering

Name of Student :

P.R.N.Number :

Roll Number :

Division :

Academic Year :

Mobile Number :

E-mail ID :



Vision of Institute

To be a Leading academic organization, creating skilled and Ethical Human Resources by leveraging Technical Education for Sustainable Development of Society.

Mission of Institute

1. To produce Competent Technocrats to meet modern societal and industrial challenges.
2. To create ethical and skilled human resources through quality education and various extension activities and outreach programs
3. To leverage technical expertise to solve societal issues for its Sustainable Development.

Values

1. Transparency
2. Integrity
3. Inclusivity
4. Empathy

Quality Policy

We strive for continual improvement in our performance through methodical academic monitoring, student participation and use of innovative teaching learning process.

◆TIME TABLE◆

Academic Year: 2022-23

Semester: I

Department: Mechanical Engineering

Class: .B.Tech

Dr. J. J. Magdum College of Engineering, Jaysingpur
Department of Mechanical Engineering

◆TIME TABLE◆


Academic Year: 2022-23
Department: Mechanical Engineering
Class Room No.: B103
Class Coordinator: Prof.S.P.Gaikwad


Semester: I
Class: Final Year B.Tech.
Revision: R0
W.e.f.: 01/09/2022


Time	Monday	Tuesday	Wednesday	Thursday	Friday
09.30 am – 10.30 am	FEA	MSD	EL-I(AUTO)	1. EL-I(AUTO) 2. FEA	EL-III(IPD)
10.30 am – 11.30 am	EL-I(AUTO)	RAC	RAC		RAC
11.30 am – 11.40 am	Short Break				
11.40 am – 12.40 pm	1. RAC 2. MSD	FEA	MSD	MSD	1. EL-III(IPD) 2. E-I(AUTO)
12.40 pm – 01.40 pm		EL-III(IPD)	FEA	EL-III(IPD)	
01.40 pm – 02.30 pm	Lunch Break				
02.30 pm – 03.30 pm	Project Phase-I	1. MSD 2. EL-II (I) IPD	Project Phase-I	EL-I(AUTO)	1. FEA 2. RAC
03.30 pm – 04.30 pm				Project Phase-I	

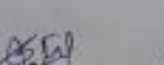
Subject	Abb.	Faculty Member	Place for Practical
Refrigeration & Air Conditioning	RAC	Prof.R.H.Vadav (Th.+Pr.)	RAC Lab (A005)
Mechanical System Design	MSD	Prof.V.J.Khot(Th.+Pr.)	Tutorial 1(B114)
Finite Element Analysis	FEA	Prof.V.J.Khot(Th.+Pr.)	MTRX Lab (B113)
EL-I- Automobile Engineering	AUTO	Prof.S.P.Gaikwad(Th.+Pr.)	Auto. Engg Lab(H002)
EL-II- Industrial Product Design	IPD	Prof.Y.R.Patil(Th.+Pr.)	IFP Lab (A008)
Seminar	SEM	Respective Project Guide	--
Summer Internship	SI	Respective Project Guide	--
Project Phase-I	pp-I	Respective Project Guide	--

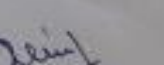
Batch	1	2
Guardian	Prof.Y.R.Patil	Prof.V.J.Khot



 Prof. M. V. Kharade
 Time Table I/C


 Prof. S. M. Sheikh
 Head,
 Dept. of Mechanical Engg.


 Prof. A. P. Sajane
 Dean, Acad. Aff.


 Dr. Mrs. S. B. Patil
 Principal I/C


 Dr. S. S. Admane
 Campus Director



Institute Information

Dr J J Magdum College of Engineering was established by Dr J J Magdum Trust, Jaysingpur in the year 1992 with an objective to promote the cause of higher education. The institute is approved by All India Council of Technical Education (AICTE), New Delhi and Government of Maharashtra, affiliated to Shivaji University, Kolhapur. The college offers B. Tech program in Mechanical, Civil, Computer Science Engineering, Electronics & Tele-Communication, Information Technology and M. Tech program in Civil Engineering-Construction Management.

Undergraduate

Programme

Branch	Degree	Intake
Civil Engineering	B.Tech. (Civil Engineering)	60
Mechanical Engineering	B.Tech. (Mechanical Engineering)	60
Computer Science & Engineering	B.Tech.. (Computer Science & Engineering)	60
Information Technology	B.Tech. (Information Technology)	60
Electronics & Telecommunication Engg.	B.Tech. (Electronics & Telecommunication Engg)	60
Computer Science & Engineering(AIDS)	B.Tech.. (Computer Science & Engineering- AIDS)	60

Post Graduate Programme

Branch	Degree	Intake
Civil(Construction Management) Engineering	M.Tech.(Civil-Construction Management)	18

Dr.J.J.Magdum Trust's

Dr.J.J.Magdum College of Engineering

Gat No. (314/330), Shirol – Wadi Road,(Agar Bhag),

Jaysingpur : 416101, Tal : Shirol, Dist : Kolhapur. State : Maharashtra

Website: www.jjmcoe.ac.in, E-mail: principal@jjmcoe.ac.in

STUDENTS ROLE

As our society/ nation grows & becomes technologically more strong / complex, it needs more trained Engineers. Students can contribute to this professional growth by playing an effective & disciplined role during their studies.

Responsibilities:

1. Punctuality, 100% Attendance & Active participation in All Academic Activities
2. Self-Discipline & good relations with other students, teaching & support staff.
3. Positive attitude, motivation and technical thinking.
4. Participation in Co-Curricular & Extra-Curricular activities.
5. Always carrying Identity Card & following the College Dress Code.
6. Pursuing all-round personality development with good generic skills.
7. Following the Code-of-Conduct by the Department, Institute & University.

Code-of-Conduct:

1. Coming late to Lectures/Practical's, common off, leave without permission is serious offence.
2. Roaming in the campus during academic work or disturbing the campus activities through shouting/ misconduct is not permitted.
3. Use of personal unauthorized electronic gadgets in department premises is objectionable.
4. Attendance less than 75% will lead to semester defaulter & make you ineligible for Exams.
5. Any form of violence, ragging, use of tobacco, alcohol or drugs on campus are serious offences punishable with rustication from the institute &/ legal action.

Let us all- Society, parents, teachers and students join hands & put our best efforts to imbibe the above mentioned behavior in our students.

ACTIVITY RECORD
(COUNSELING, CO/EXTRA CURRICULAR, LEAVE)

Counseling Staff Name:

Date	Topic	Suggestion

Co/Extra Curricular Activities:

Date	Activity Name	Participation level	Outcome

Leave Record:

Sr. No.	From	To	Reason	Permitting Staff	Remark

DEPARTMENT OF MECHANICAL ENGINEERING

The Department of Mechanical Engineering was established in the year 1992 with a sanctioned intake of 60 along with the establishment of institute intake increases 120 in 2011-12. The department has a good intermingle of experienced and young faculty which works as a team to strengthen the department.

VISION of Department

To produce Technical Professionals with high ethical values to become a globally competent.

MISSION of Department

1. To provide conducive Teaching Learning environment.
2. To provide state of the art Technical Infrastructure.
3. To provide value added courses for developing Professional and ethical values.

Programme Educational Objectives (PEO's)

1. To train students with good of knowledge in core areas of Information Technology and related engineering so as to analyze, design, and synthesize data and technical concepts.
2. To inculcate in students to maintain high professionalism and ethical standards, effective oral and written communication skills, to work as part of teams.
3. To provide our graduates with learning environment awareness of the life-long learning needed for a successful professional career and to introduce them to written ethical codes and guidelines, perform excellence, leadership and demonstrate good citizenship.
4. To provide students with academic environment that is aware of excellence, leadership, entrepreneurship, ethical responsibility and ability to work in multidisciplinary teams.
5. To train students with excellent scientific and engineering knowledge so as to understand, analyze, design and create products and solutions for Software engineering problems.

Programme Outcomes (PO's)

At the end of successful completion of program, the graduates will be able to,

1. **Engineering Knowledge:** Apply knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering pr
2. **Problem Analysis:** Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental
4. **Conduct investigations** of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid
5. **Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an under-standing of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering
7. **Environment and Sustainability:** Understand and the impact of professional engineering solutions in societal and environmental contexts and demonstrates knowledge of and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering
9. **Individual and Teamwork:** Function effectively as in visual, and as a member or leader in diverse teams and in multidisciplinary s
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear
11. **Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these too noels on work, as a member and leader instead, to manage projects and in multidisciplinary enviro
12. **Lifelong Learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological

Program Specific Outcomes (PSO)

1. Posses comprehensive knowledge of engineering material and their physical and mechanical properties.
2. Analyse and draw meaningful conclusion from the solution of design problem.
3. Posses adequate knowledge of manufacturing, metrology and quality control(processes, tools, equipments and accessories etc.) and skill to apply them appropriately.
4. Ability to use software packages related to design, analysis and manufacturing.

Laboratory and Classroom Instructions

Laboratory instructions:

- Handle all Devices /equipments carefully
- Follow safety procedures & avoid damage to self and equipment
- Inform to respective faculty before beginning your experiment
- Help to conserve energy, Switch off the equipments tubes & fans before leaving the laboratory
- Inform the lab assistant or lab in-charge when any fault arises during the performance of an experiment
- Report any not working equipment to the lab instructor; don't open/ remove the cover/ attempt to repair any equipment.
- Do not move the instruments from one laboratory to another , without permission

Classroom instructions:

- Maintain silence in class rooms
- Don't write anything on seating bench and walls of classroom.
- Keep your mobiles switched off
- Attend classes regularly and be punctual for your classes.
- Your reason of absence should be timely informed to your class teacher with written application.
- Help to conserve energy, Switch off fans and tubes before leaving the classroom.
- Keep the Classrooms clean

Department Academic Planner (2022-23 Sem-I)

Sr. No.	ACTIVITY	DATES
1	Commencement of Semester I	24-08-2022
2	Commencement of classes	24-08-2022
3	Course Monitoring Meeting	Last week of every month
4	Proctor Meeting	Last week of every month
5	Commencement of Practical's	01-09-2022
6	Expert Lecture– Dept. EDC	Last week of September
7	DRC- I	22 & 23 September 2022
8	Organization of STTP	1 st week of November
9	Expert Lecture - Alumni	Month of October
10	Industrial Visit	Month of October , November and December
11	Expert Lecture - Alumni	Month of November
12	Advisory Board Meeting	First week of November
13	Expert Lecture– Dept. EDC	Last week of November
14	Alumni Meet	2 nd week of December
15	Parent Meet	2 nd week of November
16	Feed Back From Student	2 nd Week of October
17	CIE – I	6th and 7th October 2022
18	Test Result (Mid-Sem)	After one week
19	MESA inauguration/ ISHRAE Revival	4 th week of September
20	CIE-II	21 st & 22 nd Nov 2022
21	End of theory/ practical's	1 st week of Dec
22	Final Submission	2 nd week of Dec
23	End of Semester -I	2 nd week of Dec (Tentative)
24	Departmental Academic Audit	2 nd week of Dec (Tentative)
25	External Practical / Oral Examination	As per university circular
26	Theory Examination (Repeater & Regular)	As per university circular

SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS AND STRUCTURE
FINAL YEAR (B. Tech.)

MECHANICAL ENGINEERING

To be introduced from the academic year

2021-22 (i.e. from June 2021) onwards

(Subject to the modifications will be made from time to time)

FINAL YEAR MECHANICAL ENGINEERING – CBCS PATTERN

SEMESTER –VII																					
S r · N o	C o u r s e (S u b j e c t T i t l e)	TEACHING SCHEME						EXAMINATION SCHEME													
		THEORY			TUTORIAL			PRACTICAL			THEORY				PRACTICAL			TERM WORK			
		Credits	N o. of L e c t u r e	H o u r s	C r e d i t s	N o. of L e c t u r e	H o u r s	C r e d i t s	N o. of L e c t u r e	H o u r s	H o u r s	M o d e	M a r k s	T o t a l M a r k s	M i n	H o u r s	M a x	M i n	H o u r s	M a x	M i n
1	PCC ME 401	3	3	3	-	-	-	1	2	2		CIE ESE	30 70	10 0	4 0		2 5	1 0	2	2 5	1 0
2	PCC ME 402	3	3	3	-	-	-	1	2	2		CIE ESE	30 70	10 0	4 0		2 5	1 0	2	2 5	1 0
3	PCC ME 403	3	3	3	-	-	-	1	2	2		CIE ESE	30 70	10 0	4 0				2	2 5	1 0
4	PCE ME 404	3	3	3	-	-	-	1	2	2		CIE ESE	30 70	10 0	4 0				2	2 5	1 0
5	PCE ME 405	3	3	3	-	-	-	1	2	2		CIE ESE	30 70	10 0	4 0		-	-	2	2 5	1 0
6	PCC ME406	-	-	-	-	-	-	1	2	2									2	25	10
7	SI ME407	-	-	-				1	-	-		-	-	-	-		-	-	-	25	10
8	PW ME 408	-	-	-				3	6	6		-	-	-	-		25	1 0		25	1 0
	TOTAL	15	15	15				10	18	18			500			75			200		

SEMESTER –VIII

1	PCC ME 409	3	3	3	-	-	-	1	2	2	ESE	70	10 0	4 0	As per BOS Guid eline s	25	1 0	2	2 5	1 0	
2	PCC ME410	3	3	3	-	-	-	1	2	2			10 0	4 0				2	2 5	1 0	
3	PCC ME 411	3	3	3	-	-	-	1	2	2	ESE	70	10 0	4 0			25	1 0	2	2 5	1 0
4	PCE ME412	3	3	3	-	-	-	1	2	2			10 0	4 0			-	-	2	2 5	1 0
5	PCE ME 413	3	3	3	-	-	-	1	2	2	ESE	70	10 0	4 0			-	-	2	2 5	1 0
6	PCC ME*** 414	2	-	-	-	-	-	-	-	-	-	-	-	-					2	25	1 0
8	M ^{PW} E4 15	-	-	-	-	-	-	3	6	6	-	-	-	-			25	1 0	6	50	2 0
	TOTA L	1 7	1 5	15				8	1 6	1 6			500				75			20 0	

CIE- Continuous Internal
Evaluation ESE – End Semester
Examination

● Candidate contact hours per week : 30 Hours(Minimum)	● Total Marks for B.E. Sem VII & VIII :1550
● Theory/Tutorial Duration:60 Minutes and Practical Duration:120 Minutes	● Total Credits for B.E. Sem VII & VIII :50
● In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
● There shall be separate passing for theory and practical (term work)courses.	

Note:

1. Professional Core Courses-Mechanical Engineering (PCC-ME) are compulsory.
2. Professional Core Electives –Mechanical Engineering (PCE-ME) are compulsory.
3. Summer Internship -Mechanical Engineering (SI-ME) is compulsory.
4. Project Work Mechanical Engineering (PW-ME) is compulsory.

5. PCC-ME*- Online Certificate Course.**

The Student should register the online course with Moodle/Swayam/MOOC/NPTEL. etc. of his interest in Recent Advances in Mechanical Engineering at a Start of his/her final year (i.e. at Semester VII.) and Same is intimated to Head of Department or Coordinator. For Term Work, Student has to Submit Completion Certificate of Course to the Department till end of Semester VIII. Term Work will be given at the end of Semester VIII. The Head of Department has to assign a Coordinator or Supervisor for Online Certificate Course.

Semester VII

Sr. No	Code No.	Subject	Credits
1.	PCC ME 401	Refrigeration and Air Conditioning	4
2.	PCC ME 402	Mechanical System Design	4
3.	PCC ME 403	Finite Element Analysis	4
4.	PCE ME 404	Elective I	4
5.	PCE ME 405	Elective II	4
6.	PCC ME 406	Seminar	1
7.	SI ME 407	Summer Internship @	1
8.	PW ME 408	Project Phase -I	3
		Total	25

Semester VIII

Sr. No	Code No.	Subject	Credits
1.	PCC ME 409	Mechatronics	4
2.	PCC ME 410	Energy and Power Engineering	4
3.	PCC ME 411	Noise and Vibration	4
4.	PCE ME 412	Elective III	4
5.	PCE ME 413	Elective IV	4
6.	PCE ME414****	Online Certificate Course	2
7.	PW ME 415	Project Phase -II	3
		Total	25

SHIVAJI UNIVERSITY, KOLHAPUR,

Final Year B.Tech (Mechanical Engineering) CBCS PATTERN Semester VII

REFRIGERATION AND AIR CONDITIONING

SUBJECT CODE: PCC ME401

Teaching Scheme:

Lectures: 3Hrs/Week

Practical: 2Hrs/Week

Credits:4

Examination Scheme:

ESE: 70Marks

CIE: 30Marks

Term Work: 25Marks

Oral Exam: 25 Marks

Pre-requisites: Applied Thermodynamics, Heat and Mass Transfer

Course Objectives:

The course aims to:

1. Study basic refrigeration cycles and Psychometric.
2. Performance Evaluation of Refrigeration and Air Conditioning Systems
3. Enable the student to analyze and solve refrigeration related problems by applying principles of mathematics, science and engineering

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Demonstrate an understanding of the need and importance of HVAC technology, the typical and some advanced and innovative schematic designs, and the goals of HVAC engineering and HVAC systems.
2. Demonstrate an understanding thermal comfort conditions with respect to temperature and humidity and human clothing and activities and its impact on human comfort, productivity, and health.
3. Demonstrate an understanding of psychometrics and its application in HVAC engineering and design and will practice or observe psychometric measurements.
4. Demonstrate an understanding of heat transfer in buildings with a given architectural design and its application to heating and cooling load estimation especially including thermal lag effects by conducting a detailed annual load analysis for a representative building and present the results of this analysis in a formal report possibly including recommendations for energy conservation.
5. Demonstrate an understanding of the engineering and operation of vapour compression and possibly heat-driven refrigeration systems and evaporative cooling systems and understand contemporary issues of ozone depletion and global warming potential with respect to refrigeration systems.

Unit 1

Application of Second Law of Thermodynamics

[03]

A Refrigerating Machine – The Second Law Interpretation, Introduction to Heat pump, Heat Engine and Refrigerator (with Numerical treatment), Energy Ratios (EER), BEE star rating COP, Power Consumption of a Refrigerating Machine, Refrigeration Cycle, vapour as a Refrigerant Reversed Carnot Cycle Limitations of Carnot Cycle with Gas as a Refrigerant, Reversed Brayton or Joule or Bell Coleman Cycle, Introduction to aero-plane air conditioning cycles (Only Theory)

Unit 2

Vapour Compression System

[08]

Limitations of Reversed Carnot Cycle with vapour as a Refrigerant, Dry versus Wet Compression, Throttling versus Isentropic Expansion, Introduction to Vapour Compression Cycle and Vapour Absorption cycle. Pressure Enthalpy Diagram and Calculations (Numerical on VCR Cycle) and effect of Operating Conditions, effect of Evaporator Pressure Effect of Condenser Pressure, effect of Suction Vapour Superheat, effect of Liquid Sub cooling, Using Liquid- Vapour Regenerative Heat Exchanger, Actual Vapour Compression Cycle. Removal of flash gas, Flash intercooling, Introduction to cryogenic Engineering and applications,

Unit 3

Refrigerants and Refrigeration Equipment

[09]

Classification, Desirable Properties like Thermodynamic, physical, and chemical. Comparison among commonly used refrigerants, Selection of Refrigerants, Effect on Ozone depletion and global warming, Alternative Refrigerants. Environmental Protection protocol and India's commitment. Introduction to role of ASHRAE & ISHRAE in refrigeration and air conditioning area, ASHRA Nomenclatures. Insulation, types and different applications, properties of ideal insulations. Introduction to Equipment such as Compressor, Condenser, Evaporator, Expansion devices. Applications of Refrigeration in Dairy plant, Ice-plant, Cold storage.

Unit 4

Psychrometry and Human Comfort

[09]

Moist air as a working substance, Psychrometric properties of air, Use of Psychrometric tables and charts, Processes, Combinations and Calculations (Numerical on Psychrometry), ADP, Coil Condition line, Sensible heat factor, Bypass factor, Air washer and its applications. Thermal exchange between human body and environment, factors affecting comfort, effective temperature comfort chart, ventilation requirements.

Unit 5

Heating and Cooling load calculations

[05]

Design of air conditioning systems, different Heat sources, - Adiabatic mixing of two air streams, sensible heat factor, RSHF, GSHP, ERSHP, Room apparatus dew point and coil apparatus dew point, Ventilation and infiltration, Inside and Outside Design condition. Cooling Load estimation, Introduction to, Variable Refrigerant Flow systems, VAV control systems, Inverter Units. Introduction to Inverter technology and its use in power failure, Introduction to Phase change material used for temperature retention in refrigerator.

Unit 6

Air Distribution System

[06]

Re-circulated air, Ventilation air, Duct work, Use of friction loss and rectangular equivalent of round duct chart, duct system, principle of duct sizing, and air distribution it's norms, diffusers, dampers, layout, duct systems for theaters, auditorium, hospitals, assembly shop etc. Energy Conservations and Green Buildings, Freeze drying, Pharmaceutical and hospital air conditioning, textile, car air conditioning (plant layout, system components and design conditioning)

Term Work:

1. Study of various conventional and Nonconventional methods of refrigeration.
2. Study and demonstration of refrigeration system. (Water cooler, refrigerators, chiller, ice plant and cold storage).
3. Trial on Electrolux-Refrigeration Test Rig.
4. Trial on heat pump test rig.
5. Study and trial on vapour absorption system
6. Trial two stage cascade system.
7. Trial on ice plant test rig
8. Trial on window air conditioner or Air Conditioning Test Rig
9. Study and demonstration on air conditioning systems. (Unitary viz Room/Split and Packaged Air Conditioners and central air conditioning/system)
10. Study and demonstration on Compressor, Condenser, Evaporator, Expansion, devices, Types, selection. Component balancing, safety devices and refrigeration controls
11. Study and demonstration of dehydration, charging leak testing and testing of refrigeration system with trouble shooting.
12. Study and demonstration of controls and safety devices in refrigeration and air conditioning.
13. Visit to central air conditioning or cold storage or dairy plant to ice plant related with refrigeration and air conditioning system.
14. Market survey of various refrigeration and air conditioning systems which include the equipment's with related specifications, manufacturers, cost and comparison with respect to tonnage, cost and presentation of report in the laboratory.

(Three trials and market survey report is compulsory.Total 10 are compulsory)

Reference Books:

1. “Basic Refrigeration And Air Conditioning”, P.N.AnanthanarayanTataMcGrawHillPublishing Company Ltd., New Delhi, 3rd Edition,(1981).
2. “Principles of Refrigeration” RoyJ. Dossat, Pearson Education, 4thEdition.
3. “Refrigeration andAir Conditioning”, Stoker.
4. “Refrigeration and Air Conditioning”, Arora Domkundwar, Pearson Education,3rd Edition.
5. “Refrigeration and Air Conditioning”,V.K.Jain.
6. Air Conditioning Principles and Systems”,Pita,PrenticeHall of India Publisher, 4thEdition.
7. “Air Conditioning Applications and Design”,W. P. Jones, Elsevier,2ndEdition.
8. “Air Conditioning Engineering”, W. P. Jones,Elsevier,5thEdition.
9. “Thermal Environmental Engineering”, Tnerellaild Prentice Hall of India Publisher,3rdEdition.

Text Book:

1. “RefrigerationandAir Conditioning”,C. P.Arora,TataMcGraw-HillPublishingCompany Ltd., New Delhi,1981,2ndEdition.
2. “Refrigeration and Air Conditioning”, by Er.R.K.Rajput.(3rdEdition,Katsonbook.)

SHIVAJI UNIVERSITY, KOLHAPUR,

Final Year B.Tech (Mechanical Engineering) CBCS PATTERN Semester VII

Mechanical System Design

SUBJECT CODE:PCC-ME402

Teaching Scheme:
Lectures: 3Hrs/ Week
Practical: 2Hrs/Week
Credits:4

Examination Scheme:
ESE: 70 Marks
CIE: 30Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Pre-requisites: Applied Mechanics, Analysis of Mechanical Elements, Theory of Machines (I&II), Machine Design (I&II),

Course Objectives:

The course aims to

1. Enable student to develop competency for new system by involving Industrial engineering aspects.
2. Acquaint student about the use of IS Codes during the design of pressure vessels.
3. Introduce student to design the mechanical Systems. Like Clutch and Braking.
4. Familiarize student about design machine tool gearbox, design internal combustion(IC) engine components and material handling systems.

Course Outcomes:

On completion of the course, students will be able to

1. Understand the role of aesthetics, ergonomics and creativity in design.
2. Understand theories and principles used in design of pressure vessels. IC Engine and material handling equipments.
3. Analyze and select suitable materials and design parameters during the design of pressure vessels, IC engine components, machine tool gear box and material handling systems as per industrial and societal requirement.
4. Evaluate the load carrying capacity, stress bearing capacity in various mechanical systems like unfired pressure vessels, IC engine components.
5. Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. as per industrial and societal requirement.
6. Create the competency in mechanical system design by applying industrial design aspect

Unit 01

Aesthetic and Ergonomic Consideration in Design:

[6] Basic

types of product forms, Designing for appearance, shape, Design features, Materials, Finishes, proportions, Symmetry, Contrast etc. Morgon's colour code. Ergonomic considerations- Relation between man, machine and environmental factors. Design of displays and controls. Practical examples of products or equipment's using ergonomic and aesthetic design principles. Creativity concept in designing. Theoretical treatment of optimum design and adequate design.

Unit 02

Department of Mechanical Engineering (SIM 2022-23).20

Pressure Vessel Design

[7]

Thin and thick cylinders; Failure criteria of vessels; Lamé's equation; Clavarino's and Birnie's equation; Autofrettage and compound cylinders; Types of pressure vessels-Horizontal and vertical; Classification of pressure vessel as per IS2825, 1969, Introduction to design of pressure vessels as per IS Codes. Shell and end closures. Effect of opening and nozzles in shell and covers. Types of pressure vessel support.

Unit 03

Design of Braking and Clutch System

[7]

Brakes: Design consideration in brakes, Band, Internal expanding shoe, External contracting shoe. Thermal consideration and rating of brakes.

Clutches: Design requirement of friction clutches, Selection criteria, Torque transmitting capacity of single plate, Multi disc clutch, Cone clutch and Centrifugal clutch.

Unit 04

Design of Gear boxes for machine tool applications

[7]

Determination of variable speed range- Graphical representation of speeds- Structure diagram- Deviation diagram- Ray diagram- Selection of optimum ray diagram- Difference between number of teeth of successive gears in a change gear box- Analysis of twelve speed gear box- Compound ray diagram

Unit 05

Design of I. C. Engine Components

[7]

Introduction to selection of material for I. C. engine components, Design of cylinder and cylinder head, Design of cylinder liners, Design of piston and piston-pins, Piston rings, Design of connecting rod, Design of crank-shaft and crank-pin.

Unit 06

Design of Material Handling System

[6]

Design of belt and chain conveyors – Power requirement, Selection of belt and chain, Design of tension take up unit, Idler pulley.

TERM WORK /LIST OF EXPERIMENTS/ LIST OF ASSIGNMENTS:

1. A detail design report and A2 size sheet containing working drawing of detail and assembly of
 - a) Design of Machine Tool Gear Box.(Three Stage, Twelve speed gear Box)
 - b) Pressure vessel design/ Brake design or Clutch design.
2. Assignment based on
 - a) Aesthetic and Ergonomic design considerations –case study.
 - b) Problems on Material Handling System.
 - c) Minimum four Problems on Design of IC Engine components. such as connecting rod, crank shaft, piston with piston rings and pins, cylinder and cylinder head.

TEXT BOOKS:

1. “Design of Machine Elements”, V.B.Bhandari, Tata Mc- Graw Hill Publication, 3rdEdition.
2. “Mechanical Engineering Design”, Shigley and C.R.Misce, Tata Mc- Graw Hill Publication.
3. “Mechanical Design Analysis”, M.F.Spotts, Prentice Hall Publication.
4. “Design of Machine Tools”, S.k. Basu and D.K. Pal Oxford and IBH Publication, 6thEdition.
5. “Machine Tools Design”,N.K. Mehta, Tata Mc- Graw Hill Publication, 5th Edition.

6. "Design Data Book", P.S. Gill (PSG) 3rd Edition.
7. I.S.:2825 Code for Unfired Pressure Vessels.

REFERENCE BOOKS:

1. "Handbook of Gear Design", Jitin Maitra, Tata Mc-Graw Hill Publication.
2. "Machine Design", Black P.H. and O. Eugene Adams, Tata Mc- Graw Hill Publication.
3. "Mechanical Design Synthesis with Optimisation Applications", Johnson R.C., Von-Nostrand-Reynold Publicaion.
4. "Engineering Design", Dieter G.E., Tata Mc- Graw Hill Publication, 4th Edition.
5. "Mechanical System Design", S.P. Patil, Jaico Publication House, New Delhi, 2nd Edition.
6. "Product Design and Process Engineering", Benjamin W. Niebel, Alan B. Draper, Tata Mc- Graw Hill Publication.
7. "Design of Pressure Vessel", Harve, CBS Publishers and Distributors Van Nostrand Reinhold.
8. "Engineering Optimization Theories and Practice", S.S. Rao, New Age Publication, 3rd Edition.
9. "Process Equipment Design", M.V. Joshi, Macmillal Publication, 3rd Edition.
10. "Machine Design", Robert L. Norton, Tata Mc- Graw Hill Publication.
11. "Machine Design", P. Kanniah, Scitech Publication, 2nd Edition.
12. "Fundamentals of Machine Component Design", Junvinall Wiley India, 5th Edition.
13. "Mechanical System Design", Anurag Dixit, SCITECH Publication.
14. "Principles of Machine Tool", Sen. Bhattacharya, New Central Book Agency.
15. Material Handling Equipments by N. Rudenko, Peace Publication.
16. Material Handling Equipments by Alexandrov, Mir Publication.

SHIVAJI UNIVERSITY, KOLHAPUR.

Final Year B.Tech(Mechanical Engineering) CBSE PATTERN Semester VII

FINITE ELEMENT ANALYSIS

SUBJECT CODE: PCC ME 403

Teaching Scheme:

Lectures : 03 Hrs. per week

Practical : 02 Hrs. per week

Credits: 04

Examination Scheme:

ESE : 70
Marks

CIE : 30
Marks

Term : 25
Work Marks

Pre-requisites: Matrices, Partial differentiation, Strength of materials. Course Objectives:

1. To define the basic finite element formulation techniques
2. To derive the finite element equations for 1D, 2D Elements.
3. To formulate and solve basic problems in Solid Mechanics & heat transfer.
4. To use commercial software to solve Basic Engineering problems in Solid Mechanics & heat transfer.

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

1. Elaborate the fundamental concepts of Finite Element method.
2. Understand the key concepts like Shape function, element stiffness and boundary conditions by finite element formulations for 1D problem.
3. Apply the finite element formulations for two dimensional problems using constant strain triangle.
4. Demonstrate the modeling aspects of axisymmetric solids subjected to axisymmetric loading.
5. Apply the finite element formulations for Planer Trusses using 1D element.
6. Solve Scalar field problems by Finite element formulation.

Unit 1 FUNDAMENTAL CONCEPTS

04

Introduction to FEA, Brief History, General FEM procedure, Simplification of problem through Symmetry, Various terminologies associated with FEA (Discretization, nodes and element) Stiffness matrix and its properties.) Application of FEM in various fields. Advantages and Disadvantages of FEA

Unit 2 ONE DIMENSIONAL ELEMENT 07

Introduction to One dimensional element, Types of One dimensional element, Derivation of Stiffness matrix and Shape function for one dimensional Linear and Quadratic element. Stress analysis of a Stepped bar, Thermal analysis of a Composite Wall and Torsion analysis of a shaft using 1 D element. Treatment of Boundary conditions by Elimination approach and Penalty approach

Unit 3 TWO-DIMENSIONAL ELEMENT 08

Introduction to two-dimensional element, Derivation of Stiffness matrix and Shape function for two dimensional linear element. Numericals on analysis using 2Delements (Constant Strain Triangle Two-Dimensional

Unit 4 ANALYSIS OF AXISYMMETRIC SOLIDS 06

Introduction & applications of Axisymmetric elements, axisymmetric formulation, finiteelement modeling, triangular element and stress calculations

Unit 5 ANALYSIS OF TRUSS 08

Trusses:-Plane trusses, Local and Global coordinate systems, Derivation of Global stiffness matrix, Formulae for calculating L and M, element stiffness matrix, Stress Calculations,Assembly of global stiffness matrix.

Unit 6 SCALAR FIELD PROBLEMS 07

Introduction, Steady state heat transfer, one dimensional heat transfer in thin fins, Twodimensional steady state heat conduction, Two dimensional fins.

TERM WORK /LIST OF EXPERIMENTS/ LIST OF ASSIGNMENTS:

1. Assignment on Discretization – types of elements, choice of element and type of meshing – automatic, mapped, meshing in criticalareas.

2. Finite Element Analysis of Stepped bar (Two or Three Steps only)using,

a) Finite Element Approach(Theory)

b) Finite Element Software (ANSYS / HYPERWORKSetc.)
Compare the results obtained by abovemethods.

3. Finite element analysis of Composite wall (Minimum threeslabs)

- a) Finite Element Approach(Theory)
- b) Finite Element Software (ANSYS / HYPERWORKSetc.) Compare the results obtained by abovemethods.

4. Use of any ONE Standard software package like ANSYS / HYPER WORKS etc. for solving following problems: (**ANY FIVE**)

- Static Analysis of Truss
- Static Analysis of Beam
- Static Analysis of Plate with a circular hole
- Thermal analysis of Composite wall under Convection &Conduction.
- Torsional Analysis of shaft.
- Analysis of Wallbracket.
- Analysis of 1Dfin.
- Introduction to Ansys Work bench
- Importing external geometry file into ANSYSClassic.
- Analysis of a machine element using ANSYS / HYPER WORKS etc.

5. Finite element analysis of STEPPED BAR in ANSYS using**APDL**.

TEXT BOOKS:

1. “Introduction to Finite Elements in Engineering”; Chandrupatala-Belgundu, PHI.
2. “Finite Element Method with Application in Engineering” Y. M. Desai, T. I. Eldho, A. H. Shah, Pearson.
3. “Textbook of Finite Elements Analysis”, P. Sheshu, Prentice-Hall of India Private Limited, New Delhi.
4. “An Introduction to Finite Element Method”; J. N. Reddy; 2/e, McGraw Hill International Editions, ISBN 0-07-112799-2
5. Finite Element Analysis – Theory and Practice”; M.J. Fagan, Longman Scientific &Technical.
6. “Finite Element Analysis”, UdaiBorker, Nandu Printers & Publishers Pvt. Ltd.Mumbai.

REFERENCE BOOKS:

1. “Practical Finite Element Analysis”, N.S. Gokhale, S.S. Deshpande, S.V. Bedekar, A.N.Thite,Finite to Infinite Publication.
2. “Concepts of Finite Element Methods”,ManickaSelvam, SCITECH publication
3. “Finite Elements Analysis – Theory and Application with ANSYS, Sawed Mouveni, Prentice HallInc.
4. “Applied Finite Elements Analysis”, Larry J. Segerlind, BSP Books Pvt Ltd.

SHIVAJI UNIVERSITY, KOLHAPUR

Final Year B.Tech(Mechanical Engineering) CBCS PATTERN Semester VII

AUTOMOBILE ENGINEERING (ELECTIVE –I)

SUBJECT CODE: PCE ME 404

TeachingScheme:

Lectures: 3Hrs/Week
Practical: 2Hrs/Week
Credits: 4

ExaminationScheme:

ESE: 70 Marks
CIE: 30 Marks
Term work: 25Marks

Pre-requisites: IC Engine & Power

plant Course Objectives:

The course aims to:

1. Describe importance and basic knowledge of automobileengineering.
2. Classify various automobile layouts andbodies.
3. Demonstrate automobile systems, wheels and tyres and automobile electrical and electronic systems for understanding construction and workingprinciple.
4. Enable students to analyze and solve problems on automobile system by focus and critical thinking.
5. Demonstrate use of modern trends, techniques and skill to fulfill industrial needs by arranging industrialvisit.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Explain components ofautomobile.
2. Distinguish various types of automobile lay outs as per drive given towheels.
3. Identify types of automobile bodies and materials used for thesame.
4. Demonstrate various automobile systems like clutch, gearbox final drive, brake,steering suspension wheels and Tyres, and its construction andworking.
5. Demonstrate various electrical and electronic systems like lighting, starting charging electronic controlled management system and its construction and working principle, sensors used inautomobile
6. Solve the problems related with various resistances for the automobile, engine power calculation.
7. Explain modern trends, techniques used inindustries.

Unit 1. Introduction **[06]**

Automobile history and development, Classification, vehicle layouts- engine location and drive arrangement, safety regulations, specifications of vehicles, Type of vehicle bodies, body parts and its advanced materials, Type of vehicle coaches , Chassis types, constructional details, Types of Frames, sub frames, frameless vehicles, details of chassis material.

Unit 2. Transmission System **[06]**

Clutch – Function and requirements, Classification, Construction and working of Single-plate, Multi-plate, Diaphragm spring and centrifugal clutches, Fluid flywheel.

Gear Box – Necessity, classification, construction of manual gear boxes like Sliding mesh, constant mesh, Synchromesh, Epicyclic gear train, Automatic transmission, Torque convertor, Electronic transmission control, Overdrive. Propeller shaft, Differential and final drive.

Unit 3 Steering and Suspension Systems **[08]**

Live and dead axles, live axle arrangement Steering systems, function, principle of steering, Ackerman and Davis, steering geometry, center point steering, cornering force, slip angle, scrub radius, steering characteristic, steering gearbox, power steering, collapsible steering.

Suspension system- Functions, Sprung and un sprung mass, Types of suspension linkages, types of spring - leaf, coil, air springs, telescopic shock absorber, hydro gas suspension, rubber suspension, Air suspension

Unit 4 Brakes, Wheels and Tyres **[07]**

Brakes: Need, principle, types, Mechanical, hydraulic and pneumatic brakes disc and drum types, airbrakes, servo and power braking, ABS, brake adjustments, defects and causes, Electronic Brake Distribution (EBD).

Wheels and Tyres: Wheel construction, alloy wheel, Types, tyre construction, tread design, specification, factors affecting tyre performance, tyre wear and its causes, wheel balancing.

Unit 5 Electrical and Electronic Systems **[07]**

Automotive batteries - lead acid batteries, Advances in batteries ,battery charging system, alternators, principle and operation of cutout and regulators, starter motor, Bendix drive, lighting and electrical accessories, automobile air conditioning, panel board instruments. Electronic Controlled Management (ECM) Systems, Automobile wiring. Sensors used in automobile.

Unit 6 Performance & Recent Trends in Automobiles **[06]**

Resistance to vehicle motion, Air, Rolling and Gradient resistance, Acceleration, Gradability and draw bar pull, Traction and Tractive effort, Distribution of weight, Power required for vehicle propulsion, (Numerical on Vehicle Resistance)

Electronic Stability Program (ESP), Traction Control System (TCS).

Term Work:

Minimum eight experiments from Group A and all experiments from Group B are to be performed.

Group A.

1. Study and demonstration of four wheeler chassis layout and vehicle body parts and its materials.
2. Study and Demonstration of working of single plate automobile clutch and clutch plate lining materials.
3. Study and demonstration of synchromesh gearbox. (necessity, interlocking mechanism, gear shifting mechanism(Troubleshooting))
4. Study and demonstration of final drive and differential. (Types of final drive gear, Troubleshooting)
5. Study and demonstration of front wheel steering geometry and steering mechanism. (Troubleshooting)
6. Study and demonstration of suspension system of a four-wheeler. (Any one suspension system from conventional or independent, trouble shooting)
7. Study and demonstration of working Hydraulic braking system. (Air bleeding of hydraulic brake, Trouble shooting)
8. Study and demonstration of Lead acid Battery.(Troubleshooting)
9. Study and demonstration of electrical charging system. (Troubleshooting)
10. Study and demonstration of electrical starting system.(Troubleshooting)
11. Study and demonstration of
a) D. C. Electric Horn b) Electric Fuel Gauge c) Flasher Unit. d) Wiper Circuit
12. Study of automobile air conditioning system.

Group B.

- 1 Experiment on wheel balancing and front wheel alignment.
 - 2 Visit to servicing station for study of vehicle maintenance, repairs and report.
- OR
2. Visit to Automobile manufacturing industry.

Text Books:

1. "Automobile Engineering", Dr. Kirpal Singh (Vol. I and II) Standard Publishers, New Delhi.
2. "Automobile Mechanics", N K Giri.
3. "Automobile Engineering", G.B.S. Narang., Khanna Publication, 3rd Edition.
4. "Automotive Technology", H.M. Sethi. Tata McGraw-Hill Education, (2001).
5. "Automobile Engineering", Banga and Singh.
6. "Automotive Mechanics", Joseph Heitner, Affiliated Eastern Law House, 2nd Edition., (1967).
7. "Motor Vehicle Technology and Practical Work", Dolan. J.A., ELBS, (1978).
8. "Automobile Electrical Equipment", P.L. Kohali, Technical Education Series, 1st Edition.
9. "Automobile Engineering", R.B. Gupta, Satya Prakasan, 9th Edition.
10. "Automotive Excellence Volume 1 and 2", Gelncoe, Tata McGraw-Hill Publication.

Reference Books:

1. “Motor Vehicles”, Newton and Steed
2. “Motor Manuals (Vol I to VII)”, A.W. Judge., Chapman and Hall Publication.
3. “Automobile Mechanics”, W.H. Crouse., Tata McGraw Hill Publishing Co.

SHIVAJI UNIVERSITY, KOLHAPUR,

Final Year B.Tech(Mechanical Engineering) CBCS PATTERN Semester VII

TOTAL QUALITY MANAGEMENT (Elective–

II) SUBJECT CODE:PCE ME 405

Teaching Scheme:

Lectures: 3Hrs.perweek

Practical- 2 Hrs. per week

Credit: 04

Examination Scheme:

ESE: 70Marks

CIE: 30Marks

Term Work: 25 Marks

Practical/Oral : 00 Marks

Pre-requisites:

Course Objectives:

- 1 Know the concept of total quality and role of quality assurance.
- 2 Understand planning and controlling techniques for quality
- 3 Understand the key issues and some popular approaches to TQM implementation
- 4 Know the reliability approach for quality
- 5 Understand the current trends in TQM

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

- 1 Understand the concepts of total quality and quality assurance approaches.
They will identify and solve issues in quality related problems in manufacturing or
- 2 service sector at various stages by using various TQM tools and techniques,
- 3 Understand vendor rating and select suitable vendor

4 Interpret various quality attributes and discuss the various quality approaches.

5 Calculate reliability of system

They will identify and solve issues in industries using the various techniques of TQM such
6 as 5S, JIT, TPM, Reliability Engineering, Quality Circle etc.

Unit 1 **Quality Assurance System:** [6]

Concept of total quality ,role and objectives of Q.A. Q.A. cycle, process approach to Q.A. (input-process-output), Information feedback, Significance of feedback and field complaints analysis in Q.A., Significance of internal customer approach, Defect prevention programs for Q.A.

Unit 2 **Planning and Controlling Techniques for Quality** [7]

Planning for quality – The dimensions of Quality(quality of Design, conformance, performance and service) Quality planning with vendors, Vendor control procedures, Vendor-rating.

Controlling techniques for quality – Seven statistical tools, Process capability analysis, Problem solving new management tools, Why-why analysis, Six sigma- Concept, Need, Implementation.

Unit 3 **Robust and Reliable Product Approach for Quality** [7]

Product and system reliability: Basic concepts, Prediction and evaluation of parallel, Series and combined system reliability, Reliability tests (life testing, burn - in test, accelerated life testing),

FMEA; and FTA, Taguchi's quality Philosophy, System design, Parameter design, Tolerance design, Orthogonal arrays, S/N ration, Loss functions.

TERM WORK /LIST OF EXPERIMENTS/ LIST OF ASSIGNMENTS:

Term Work: case studies through industrial visits on:

1. Tools and techniques of TQM
2. TQM implementation in manufacturing sector
3. TQM implementation in Service Sector
4. ISO 9001-2008 implantation.

(Presentation is preferable for case studies)

Content Assessment Tool

1. case studies on above topic
2. case studies on above topic
3. case studies on above topic
4. case studies on above topic.
5. Four assignments based on the syllabus

TEXT BOOKS:

- 1 “Practical Reliability Engineering”, Patrick D.T. O’connor, , Wiley India, (ISBN 978-81-265-1642- 1), 4th Edition.
- 2 “Total Quality Management–Text and cases”, Jankiraman and Gopal, Prentice Hall India Publication. (ISBN 978-81-203-2995-9).
- 3 “Total Quality Management” Dr. Suri and Dr. Sharma, Wiley Publication, (ISBN 978-93-5004- 317-2).
- 4 “Total Quality Management”, Dr. Rajaram, Wiley Publication, (ISBN 978-81-7722-63-2).

REFERENCE BOOKS:

- 1 “Total Quality Management”, Dale H. Besterfield, et.al., Pearson Education, Asia (ISBN 978-81- 317-3227-4).
- 2 “Total Quality Management”, Dr. Poornima Charantimath Pearson Education, Asia (ISBN 978-81- 317-3262-5) , 2nd Edition.
- 3 “Quality Planning and Analysis”, Juran J.M and Gryna.
- 4 “Handbook of Total Quality Management” Dr. R.P. Mohanti, R.R. Lakhe Jaico Publishing House , (ISBN 81-7224-833-44).

- 5 “Inspection, Quality Control and Reliability”, Sharma S.C., Khanna Publishers (ISBN 81-7409-022-3).
- 6 “Global Management Solutions Demystified”, Dinesh Seth, Subhash C. Rastogi, Cengage Education (Former Thomson Asia Pvt. Ltd.) (ISBN 981-265-142-X).
- 7 “Managing Quality”, Barrie G Dale, Wiley India Pvt. Ltd. (ISBN 978-81-265-2246-0), 5th Edition..
- 8 “Total Quality Control”, Feigenban, Tata McGraw Hill Book Company, New York.
- 9 “Fundamentals of Quality Control and Improvement”, Amitava Mitra Pearson Education, Asia.

SHIVAJI UNIVERSITY, KOLHAPUR,

Final Year B.Tech(Mechanical Engineering) CBCS PATTERN Semester VII

Industrial Product Design (Elective- II)

SUBJECT CODE:PCE-ME-405

TeachingScheme:

Lectures: 3Hrs/ Week

Practical: 2Hrs/Week

Credits:4

Examination Scheme:

ESE: 70Marks

CIE: 30 Marks

Term Work: 25Marks

Pre-requisites: Machine Design, Manufacturing Engineering.

Course Objectives:

The course aims to:

1. Study the various parameters in product design and development like
 - Finding Customer Need
 - Doing Market Research in various parameters for product
 - Product Specifications criteria
 - Product Architecture and Prototyping
 - Cost and Value Engineering
 - Design for Manufacturing and Assembly
 - Standards in Ergonomics and Industrial Safety
2. Practice exposure to Case Studies and CAD Software with a product case.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Find the Customer Needs for a Quality Product through Market Research in product development process, Concept Generation, Selection and Testing.
2. Describe basics of Product Architecture, Prototyping and Cost and Value Engineering. Select the Standard Ergonomics and Industry Safety parameters in Product Design.

Unit01

[06]

Introduction

Challenges of product development, Identify customer needs, Successful product development, Quality aspect of product design, Market Research, Survey.

Unit02

[07]

Product Development Process and Planning

Innovation and Creativity in Product Design, Product Planning Processes, Product specifications: Process of setting specifications. (Concept Generation–Selection–Testing)

Unit03

[07]

Product Architecture

Product Architecture: Implication of architecture, Establishing the architecture, Related system level design issue, Product Data Management, Use of Computerized Data Management and `Process, Industrial Design: Overview.

Unit04

[07]

Design for Manufacturing and Assembly

Tolerance, Design of Gauges, Design for Environment, Prototyping, Engineering Materials, Concurrent Engineering, Product Costing, Value engineering.

Unit05

[08]

Aesthetics:

Aesthetic Considerations, Visual Effects of Form and Color in Product Design.

Ergonomics:

Ergonomics and product design and automated systems, Anthropomorphic data and its applications in ergonomic design, Limitations of Anthropomorphic data, General approach to the Man-Machine Relationship - Work station Design and environment (working position and posture).

Control and Displays:

Configurations and sizes of various controls and displays, Design of controls in automobiles, machine tools etc., Design of instruments and controls.

Unit06

[05]

Industrial Safety:

An approach to Industrial Design - Elements of Design Structure for Industrial Design in engineering applications in manufacturing systems. Personal protective Equipment and Environment Control Prevention and specific safety measures for manufacturing and processing industry and chemical industry.

Term Work:

1. Case Study on any TWO (by a group, a group of Min.02 and Max.04 students to be presented in front of all students) covering following points,

- a. Product Development Process /Planning.
- b. Product Architecture.
- c. Design for Manufacturing.
- d. Design for Assembly.
- e. Aesthetic and Ergonomic considerations in Product Design.
- f. Industrial Safety in Machine and Equipment Handling.

- g. Health Safety in Product Design.
 - h. Environmental Safety and ISO 14000 Systems.
2. Development of any Product using high end CAD software considering following points.

- a) Need of Customer, Methodology of Market Survey.
- b) Invention / Innovation of a product with modifications required.
- c) Aesthetics (Form and Color) and Ergonomics consideration in design.
- d) Preparation of various Views of the product.
- e) Design for Assembly Procedures.
- f) Product and Maintenance Manual.
- g) Product Database Management.

A report should be prepared with details, drawing sheet, Bill of Material, Assembly– Disassembly Procedure, Maintenance Manual and Cost Estimation (if required) Presentation of the product designed.

Text Books:

1. “Product Design and Development”, Karl T. Ulrich, Steven G. Eppinger, Irwin Tata McGraw Hill, 3rd Edition.
2. “Product Design and Manufacturing”, A.C. Chitale and R.C. Gupta, Prentice Hall of India, 3rd Edition.
3. “Product Design”, Otto and Wood, Pearson Education.
4. “Human Factor Engineering”, L P Singh, Galgotia Publication Pvt. Ltd, 1st Edition.

Reference Books:

1. “New Product Development”, Tim Jones, Butterworth, Heinemann, Oxford, (1997).
2. “Assembly Automation and Product Design”, Geoffrey Boothroyd, Marcel Dekker, CRC Press.
3. “Industrial Product Design”, C W Flureshem.
4. “Industrial Design for Engineers”, Mayall W.H, London, Hiff books Ltd.
5. “Introduction to Ergonomics”, R.C. Bridger, Tata McGraw Hill Publication

SHIVAJI UNIVERSITY, KOLHAPUR,

Final Year B.Tech(Mechanical Engineering) CBSE PATTERN Semester VII

SEMINAR

SUBJECT CODE:PCC ME 406

Teaching Scheme:

Practical: 02Hrs/week

Examination Scheme:

Term Work: 25 Marks

Credit:1

Course Objectives:-

The course aims to:

1. Create awareness about latest technological aspects
2. Improve presentation and communication skills
3. Improve skills related to search on the internet
4. Motivate for research in respective area
5. Provide platform for interaction amongst students on advanced and/or emerging topics of technology.

Course Outcomes:-

Upon successful completion of this course, the student will be able to

1. Have and develop presentation skills.
2. Impart knowledge in different aspects of knowledge domains.
3. Make them aware of knowledge in industry perspective and new industry trends.
4. Build confidence and improve communication skills.
5. Collect ideas through literature survey about new innovations, analyze and present them.
6. Sharpen their personality and intelligence.

Schedule for the semester

1. **1st week:** Discussion of relevance, objectives and outcome expectations with students.
2. **2nd to 4th week:** Preliminary discussions, topic identification and synopsis submission, topic approval by guide.
3. **5th to 10th week:** Collecting detailed information, discussion with guide, preparation of Seminar report and PPT, approval from guide.
4. **11th to 14th week:** Seminar delivery by each student for 20 minutes followed by question answer session and discussion for 10 minutes. Each student should deliver seminar in front of other students from the batch, guide and another expert appointed by HOD

Topic selection

Individual student shall chose seminar topic from engineering/allied/applied field under the guidance of allotted guide. Student should collect information from reference books, handbooks, technical research journals, catalogues, etc. related with the topic and beyond the details covered in the curriculum of mechanical engineering undergraduate course.

Instructions for report writing and presentation

Prepare two hard copies of seminar report of 20 to 30 pages each (one for student and other for department). For standardization of the seminar reports the following format should be strictly followed. Student should also submit soft copy of the seminar report and presentation.

1. Page size: Trimmed A4
2. Top Margin: 1.00 Inches
3. Bottom Margin: 1.32 Inches
4. Left Margin: 1.5 Inches
5. Right Margin: 1.0 Inches
6. Para Text: Font - Times New Roman; 12 Point
7. Line Spacing: 1.5 Lines
8. Page Numbers: Right aligned and in footer. Font Times New Roman; 12 Point
9. Headings: Times New Roman, 14 Point, Boldface
10. Certificate: All Students Should Attach Standard Format

The entire seminar should be documented as one chapter. The usual steps involved in writing report are: (a) logical analysis of the subject-matter; (b) preparation of the final outline; (c) preparation of the rough draft; (d) rewriting and polishing; (e) preparation of the final bibliography; and (f) writing the final draft. For more details about report writing and formats students and guide are advised to refer, "Kothari, C.R., *Research Methodology Methods and Techniques*, New Delhi, New Age International (P) Ltd., Publishers, 2nd Edition, 2004" Record of the referred literature should be submitted in either hard or soft form at the time of seminar presentation.

Seminar work load

1. 2 hours work load/practical batch/faculty

SHIVAJI UNIVERSITY, KOLHAPUR,

Final Year B.Tech (Mechanical Engineering) CBCS PATTERN Semester VII

SUMMER INTERNSHIP

SUBJECT CODE: -SI ME 407

Teaching Scheme:

Examination Scheme:

Term Work: 25 Marks

Credits: 01

Course Objective:

The course aims to:

1. Familiar the students to realize an industrial work.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Comprehend the knowledge gained in the coursework
2. Create, select, learn and apply appropriate techniques, resources, and modern engineering tools.

Industrial Training

The students have to undergo an industrial training of minimum two weeks in an industry preferably dealing with Mechanical engineering during the semester break after Sixth semester and complete within 15 calendar days before the start of seventh semester. The students have to submit a report of the training undergone and present the contents of the report before the evaluation committee constituted by the department. An internal evaluation will be conducted for examining the quality and authenticity of contents of the report and award the marks at the end of the semester.

It is expected that students should undertake small assignment or work related to any of the course related aspect. Report is based on compilation of work carried out related to facility and layout planning, Industrial engineering- time study and motion study, Line efficiency evaluation and improvement, Process capability evaluation, Industrial automation, Process or machinery modification as identified.

Industrial Training Report Format:

Maximum fifteen students in one batch, involving three groups of maximum five students, shall work under one Faculty. The same group shall work for project under the same guide. However, each student should have different industrial training and its presentation.

The report should be of 20 to 30 pages. For standardization of the report the following format should be strictly followed.

1. Page Size: Trimmed A4
2. Top Margin: 1.00 Inch
3. Bottom Margin: 1.32 Inches
4. Left Margin: 1.5 Inches

5. Right Margin: 1.0Inch
6. Para Text: Times New Roman 12 Point. Font

7. Line Spacing: 1.5Lines
8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman
9. Headings: Times New Roman, 14 Point ., Bold Face
10. Certificate: All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/Director.

The entire report should be documented as one chapter with details like

1. "Name of Industry with address along with completed training certificate"
2. Area in which Industrial training is completed

All Students have to present their reports individually.

SHIVAJI UNIVERSITY, KOLHAPUR,
Final Year B.Tech(Mechanical Engineering) CBCS PATTERN Semester VII

PROJECT PHASE-I

SUBJECT CODE: PW ME408

Teaching Scheme:

Practical: 2 Hrs/Week/Batch

Credits: 3

Examination Scheme:

Term Work: 25Marks

Oral Exams: 25Marks

Course Objectives:

The course aims to:

1. Embed the skill in group of students to work independently on a topic/ problem/ experimentation selected by them and encourage them to think independently on their own to bring out the conclusion under the given circumstances of the curriculum period in the budget provided with the guidance of the faculty.
2. Encourage creative thinking process to help them to get confidence by planning and carrying out the work plan of the project and to successfully complete the same, through observations, discussions and decision making process.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Improve the professional competency and research aptitude in relevant area.
2. Develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

Project Phase I Load:

A batch of maximum three groups of four to five students per group, shall work under one Faculty member of department. The group of one student is strictly not allowed.

Project Phase I Definition:

The project phase I work can be a design project / experimental project and or computer simulation project on Mechanical engineering or any of the topics related with Mechanical engineering stream. The project phase I work is allotted in groups on different topics.

The students groups are required to undertake the project phase-I during the seventh semester and the same is continued in the eighth semester (Phase-II). Project Phase-I consists of reviews of the work carried earlier and the submission of preliminary report. Report should highlight scope, objectives, methodology, approach and tools to be used like software and others, outline of project and expected results and outcome along with timeframe.

The project phase I work is to be extended for project phase II at B. E. (Mech.) Sem. VIII with same group working under guidance of same Faculty member assigned for project phase I.

Project Phase I Term Work:

The term work under project submitted by students shall include

1. Work Diary: Work Diary maintained by group and countersigned by the guide weekly. The contents of work diary shall reflect the efforts taken by project group.

- a. Searching suitable projectwork
- b. Brief report preferably on journals/research or conference papers/books or literature surveyed to select and bring up theproject.

- c. Day to day activities carried out related to project work for entire semester.
- d. Synopsis.

The group should submit the synopsis in following format

- i. Title of Project
 - ii. Names of Students
 - iii. Name of Guide
 - iv. Relevance
 - v. Present Theory and Practices
 - vi. Proposed work
 - vii. Expenditure
 - viii. References
2. The synopsis shall be signed by each student in the group, approved by the guide and endorsed by the Head of the Department
 3. Presentation: The group has to make a presentation in front of the Faculty members of department at the end of semester.

Project Phase I Report Format:

Project Phase I report should be of 25 to 30 pages (typed on A4 size sheets). For standardization of the project phase I reports the following format should be strictly followed.

1. Page Size: Trimmed A4
2. Top Margin: 1.00 Inch
3. Bottom Margin: 1.32 Inches
4. Left Margin: 1.5 Inches
5. Right Margin: 1.0 Inch
6. Para Text: Times New Roman 12 Point. Font
7. Line Spacing: 1.5 Lines
8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman
9. Headings: Times New Roman, 14 Point, Bold Face
10. References: References should have the following format
For Books: "Title of Book", Authors, Publisher, Edition
For Papers: "Title of Paper, Authors, Journal/Conference Details, Year

Important Notes:

- Project group should continue maintaining a diary for project and should write (a) Book referred (b) Company visited (c) Person contacted (d) Computer work done (e) Paper referred (f) Creative thinking.
- The Diary along with Project Phase I Report shall be assessed at the time of oral examination
- One copy of the report should be submitted to Institute/ Department, One copy to Guide and one copy should remain with each student of the project group.

Department of Mechanical Engineering
RUBRIC for Project-Work Assessment

	UNACCEPTABLE	DEVELOPING	GOOD	EXCELLENT
Selection of Project	<input type="checkbox"/> Neither Sponsored nor well explored. <input type="checkbox"/> Very Low Utility. <input type="checkbox"/> Low Scope for Skills demonstration.	<input type="checkbox"/> Not Sponsored but some exploration. <input type="checkbox"/> Low Utility. <input type="checkbox"/> Some Scope for Skills demonstration.	<input type="checkbox"/> Partially Sponsored and sufficiently explored. <input type="checkbox"/> Acceptable Utility. <input type="checkbox"/> Adequate Scope for Skills demonstration.	<input type="checkbox"/> Fully Sponsored and well explored. <input type="checkbox"/> High Utility. <input type="checkbox"/> High Scope for Skills demonstration.
Clarity of Objectives.	<input type="checkbox"/> Little efforts put in Identification & Formulation. <input type="checkbox"/> Objectives Need major reworking. <input type="checkbox"/> Unclear Presentation of Intentions.	<input type="checkbox"/> Some efforts put in Identification & Formulation. <input type="checkbox"/> Objectives Need Some reworking. <input type="checkbox"/> Needs some clarity in Presentation of Intentions.	<input type="checkbox"/> Sufficient efforts put in Identification & Formulation. <input type="checkbox"/> Acceptable Objectives. <input type="checkbox"/> Acceptable clarity in Presentation of Intentions.	<input type="checkbox"/> Thorough efforts put in Identification & Formulation. <input type="checkbox"/> Very Clear Objectives. <input type="checkbox"/> High Clarity in Presentation of Intentions.
Problem Solving	<input type="checkbox"/> Little use of Engg. Knowledge. <input type="checkbox"/> No Engineering tools used. <input type="checkbox"/> Little use of Design Skills	<input type="checkbox"/> Some use of Engg. Knowledge. <input type="checkbox"/> Some Engineering tools used. <input type="checkbox"/> Some Design Skills used.	<input type="checkbox"/> Sufficient use of Engg. Knowledge. <input type="checkbox"/> Acceptable use of Engineering tools. <input type="checkbox"/> Acceptable use of Design Skills.	<input type="checkbox"/> Excellent use of Engg. Knowledge. <input type="checkbox"/> Sufficient use of Engineering tools. <input type="checkbox"/> Sufficient use of Design Skills
Team-Work.	<input type="checkbox"/> Unclear work distribution. <input type="checkbox"/> Very Low Team Communication. <input type="checkbox"/> Team attitudes are Negative.	<input type="checkbox"/> Some form of work distribution. <input type="checkbox"/> Low Team Communication. <input type="checkbox"/> Team Attitudes need improvement.	<input type="checkbox"/> Clear work distribution. <input type="checkbox"/> Acceptable Team Communication. <input type="checkbox"/> Team Attitudes are Acceptable.	<input type="checkbox"/> Very Clear work distribution. <input type="checkbox"/> Good team Communication. <input type="checkbox"/> Team Attitudes are very positive.
Demonstration and Report.	<input type="checkbox"/> Un-organized demonstration. <input type="checkbox"/> Very Low Attainment of objectives. <input type="checkbox"/> Report is imprecise, incomplete & inconclusive.	<input type="checkbox"/> Some order in Demonstration. <input type="checkbox"/> Low Attainment of Objectives. <input type="checkbox"/> Report is somewhat imprecise, incomplete & inconclusive.	<input type="checkbox"/> Acceptable order in Demonstration. <input type="checkbox"/> Adequate Attainment of Objectives. <input type="checkbox"/> Report is precise, complete & conclusive.	<input type="checkbox"/> Very Clear order in Demonstration. <input type="checkbox"/> Full attainment of Objectives. <input type="checkbox"/> Report is very precise, complete & conclusive.

Student Self Assessment RUBRIC for Term-Work Assessment

CRITERIA	UNACCEPTABLE	DEVELOPING	GOOD	EXCELLENT
Lecture Attendance & Involvement.	<input type="checkbox"/> My Attendance is Very Low. <input type="checkbox"/> I am Inattentive in class <input type="checkbox"/> I Never involve in the Q/A during Lecture	<input type="checkbox"/> My Attendance is Low <input type="checkbox"/> I am Sometimes Attentive in class <input type="checkbox"/> I Sometimes involve in Q/A during Lecture	<input type="checkbox"/> My Attendance is Acceptable. <input type="checkbox"/> I am Mostly Attentive in class <input type="checkbox"/> I Generally involve in Q/A during the Lecture	<input type="checkbox"/> I have full Attendance <input type="checkbox"/> I am Always Attentive in class <input type="checkbox"/> I Eagerly involve in Q/A during the Lecture
Lab work Attendance & Involvement.	<input type="checkbox"/> My Attendance is Very Low <input type="checkbox"/> I don't Come prepared. <input type="checkbox"/> I Avoid involvement in Lab work.	<input type="checkbox"/> My Attendance is Low <input type="checkbox"/> Sometimes I come prepared. <input type="checkbox"/> I am Sometimes involved in Lab work.	<input type="checkbox"/> My Attendance is Acceptable. <input type="checkbox"/> Mostly I am prepared. <input type="checkbox"/> I am Generally involved in Lab work.	<input type="checkbox"/> I have Full Attendance. <input type="checkbox"/> I come Always prepared. <input type="checkbox"/> I Eagerly involve in all Lab work.
Lab work report writing , Assignments & Submissions	<input type="checkbox"/> None of my submissions are on Time. <input type="checkbox"/> My Submission lack readability & clarity.	<input type="checkbox"/> Few of my submissions are on time <input type="checkbox"/> Some of my submissions are readable & clear.	<input type="checkbox"/> Most of my submissions are on time. <input type="checkbox"/> Most of my submissions are readable & clear.	<input type="checkbox"/> All of my submissions are on time. <input type="checkbox"/> All of my submissions are readable & clear.
Efforts made in Class Tests.	<input type="checkbox"/> I Appear Unprepared. <input type="checkbox"/> My Average Score is Very Low	<input type="checkbox"/> My Preparation & presentation is not sufficient. <input type="checkbox"/> My Average Score is Low	<input type="checkbox"/> My preparation & presentation is Adequate <input type="checkbox"/> My Average Score is Acceptable	<input type="checkbox"/> My preparation & presentation is excellent <input type="checkbox"/> My Average Score is High
Oral Communication to Questions on Subject/ course contents.	<input type="checkbox"/> I become Anxious & Uncomfortable. <input type="checkbox"/> I Make No effort to understand the Questions <input type="checkbox"/> My Communication in not clear.	<input type="checkbox"/> Sometimes I am Relaxed & Comfortable. <input type="checkbox"/> I Make Some effort to understand the Questions. <input type="checkbox"/> My Communication is barely clear.	<input type="checkbox"/> Mostly I am Relaxed & Comfortable. <input type="checkbox"/> I Make effort to understand the Questions. <input type="checkbox"/> My Communication is mostly clear	<input type="checkbox"/> I am Always Relaxed & Comfortable. <input type="checkbox"/> I Understand the Questions Effortlessly. <input type="checkbox"/> My Communication is always very clear.

