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SECTION – I

CURRICULUM PHILOSOPHY AND STRUCTURE

1. CURRICULUM DEVELOPMENT: INTRODUCTION AND PROCESS OF DEVELOPMENT OF OUTCOME BASED CURRICULUM

Curriculum Design and Development:

Curriculum is an absolute instructional and effective instrument designed with a student centered approach. It incorporates systematic method of teaching learning process. It is a sequence of planned academic activities; on completion of which the desired programme outcomes are expected to be attained in the student. The curriculum and the course contents are expected to motivate the students to acquire desired level of knowledge and skills. An emphasis and an attempt has been made in the curriculum to get a perfect blending of theoretical concepts and actual requirements of industry. Keen attention has been provided to make it more structured by incorporating the valuable suggestions of industrial experts of PBOSs and feedback by the field and academic professionals. An overview of systematic and scientific mode of implementation and evaluation has also been pondered; consequently a practicable model of it has been achieved. It incorporates specific guidelines and assessment criteria for theory/practical/oral modes of evaluation. Specification table for each course has been provided to prepare question paper justifying meticulous coverage.

Curriculum philosophy:

The impact of globalization and rapid changes in the engineering science and technology have been a great cause of comprehensive and noticeable change in engineering fraternity, hence the institutions. Only way to incorporate such a transformation, is to modify the curriculum, preserving the consistency of engineering education. Frequent review and feedback from the experts and the freedom of autonomous status of the institution have encouraged to undertake relevant changes in the curriculum to make it versatile. Consequently the desired competencies and skills are transformed amongst the students in pursuing their preparedness to cope up with the global changes. It aims to promote self-reliance and satisfaction of acquiring modern engineering concepts and multi capabilities within the students to make them model technicians.

"Curriculum is an educational program designed and implemented to achieve specified programme outcomes"

Hence, in a broad sense, a curriculum incorporates the following:

- To define the purpose of education
- To accept systematic planning methods
- To confirm implementation strategies
- To identify and to incorporate needs of industries
- To follow the policy directives
- To cope-up with social concerns
- To aim at personality development of students
- To allow future developments and challenges in emerging science and technology.

Outcome-based Curriculum

Outcome based curriculum is the curriculum based on the concepts of outcome-based education (OBE) philosophy. India is a permanent signatory of the Washington Accord - the international agreement among bodies responsible for accrediting engineering programmes with the National Board of Accreditation (NBA) as the national authority for accrediting degree and diploma programmes in engineering in India. Hence as per the accreditation criteria of the NBA, the curriculum of the Institute is expected to be outcome based.

Outcome Based Education (OBE) is an educational approach in which all the activities of an education system are based on attainment of pre-defined learning outcomes of student. The approach is to be included in the following three aspects of education system:i) Curriculum Design, ii) Curriculum Implementation, iii) Students' Evaluation. The flow diagram shown below summarizes the elements of Outcome-based Education System. The glossary of terms used in academic autonomy and OBE are provided for reference.



Glossary of terms related to Outcome Based Education

Outcome-Based Education (OBE) - It is an educational approach in which all the activities of an education system are based on attainment of pre-defined learning outcomes of student.

The approach is to be included in the following three aspects of education system :i) Curriculum Design, ii) Curriculum Implementation, iii) Students' Evaluation

Washington Accordand NBA–It is an International Agreement among bodies responsible for accrediting undergraduate engineering degree programmes. Established in 1989, the signatory countries as of 2014 are Australia, Canada, Taiwan, Hong Kong, India, Ireland, Japan, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Sri Lanka, Turkey, the United Kingdom and the United States. National Board of Accreditation (NBA), India has become the permanent signatory member of the Washington Accord on 13thJune 2014.

The membership of Washington Accord is an international recognition of the quality of undergraduate engineering education offered by the member country and is an avenue to bring it into the world class category. It encourages and facilitates the mobility of engineering graduates and professionals at international level.

NBA accreditation is a quality assurance scheme for higher technical education in India.

The Washington Accord covers engineering degrees and diploma under outcome-based education approach.

Vision of Institute - It is a statement that defines concisely the aspirations to be achieved in the near future by the Institute

Mission of Institute - It is a set of statements that defines the broad steps to be executed to achieve the vision of the Institute

Vision of Programme - It is the vision statement for a particular educational programme (like Civil Engineering Programme, Mechanical Engineering Programme, etc.). Programme Vision should be consistent with the Institute vision

Mission of Programme - It is the set of statements that define the broad steps to be executed to achieve the vision of the educational programme

Programme Educational Objectives (PEOs) - It is a set of 3 to 5 statements defining the objectives to be attained in order to execute the mission

Programme Outcomes (POs) – It is a set of ten generic outcomes, stated by NBA, expected from any engineering diploma-holder in India

Programme-specific Outcomes (PSOs) – It is a set of 2 to 4 outcomes to be defined by the programme under consideration in addition to the POs

Course Outcomes (**COs**) – It a set of about 6 outcomes, expected to be attained by student on learning a course. Course Outcomes shall be defined in curriculum for each course. Course outcomes are worded using action verbs like solve, explain, calculate, compare, distinguish, describe, draw, etc.

Mission-PEO Consistency Matrix – It is a matrix showing degree of consistency of PEOs with mission

PO-CO Consistency Matrix – It is a matrix showing degree of consistency of COs with POs and PSOs

Competency – It is the set of specific abilities, categorized as cognitive, psychomotor and affective domains of learning, from which course outcomes statements are derived

Cognitive domain –It is the set of abilities related to thinking

Bloom's Revised Taxonomy of Cognitive Domain: It is a six-level cumulative hierarchy of cognitive abilities in the order of increasing complexity as follows:

Remembering > Understanding > Applying > Analyzing > Evaluating > Creating

Psychomotor Domain: It is the set of abilities related to physical and psychological skills

Taxonomy of Psychomotor Domain: It is a six-level cumulative hierarchy of cognitive abilities in the order of increasing complexity as follows:

Perception > Set> Guided response>Mechanism > Adaptation > Origination

Affective Domain: It is the set of abilities related to attitudinal development

Taxonomy of Affective Domain: It is a five-level cumulative hierarchy of affective abilities in the order of increasing complexity as follows:

Receiving > *Responding* > *Valuing* > *Organizing* > *Characterizing*

Educational Technology: It is the systematic study of theoretical foundations and material tools to facilitate learning

Glossary of terms used in Academic Autonomy and MPECS

Academic Autonomy – It is the freedom and responsibility offered to the Institute by the Government to attain high quality standards in the following three dimensions:

i) Design of own curricula ii) Conduct of own examinations iii) Award of own diploma

Multi-point Entry and Credit System (MPECS) – It is a system of education in which student can be admitted at different entry levels of qualification and he is offered *credits* along with marks on passing in a course

Credits – It is the number of weekly instructional hours provided for a course in the curriculum

Programme – It is the particular branch of Engineering in which Diploma is awarded. e.g. Civil Engineering Programme, Mechanical Engineering Programme, etc.

Curriculum – It is a document providing plan of the complete academic activity to be conducted by student for award of Diploma in a Programme in tune with the vision of the Institute

Course – It is a particular subject defining study and evaluation unit of the curriculum. e.g. Applied Mechanics, Engineering Drawing-1, etc.

Syllabus – It is the complete academic information regarding a particular course in a curriculum

Course Registration (CR) -It is the procedure to be carried out by every student at the beginning of every semester in which he/she has to declare the courses he/she is going to study in that semester as per academic time table of the Institute. The registration is to be done as per *Rules of Registration* of the Institute.

Examination Registration (ER) -It is the procedure to be carried out by every student at the beginning of every semester in which he/she has to declare the courses in which he/she is going appear for examination in that semester as per examination time table of the Institute. The registration is to be done as per *Rules of Registration* of the Institute.

Curriculum MPECS-2016 - It is the Curriculum of the Institute revised in the year 2016. It is applicable to the students admitted since 2016

Programme Department – It is the department of the Institute offering Diploma in a particular Programme. e.g. Civil Engineering Department, Mechanical Engineering Department, etc.

Programme Dean – He/she is the Head of Department of a Programme Department

Allied Department – It is department that does not award diploma and contributes to curriculum implementation of many Programmes. e.g. Applied Mechanics Department, Workshop Department, Science Department, English Department, Mathematics Department, etc.

Academic Autonomy and MPECS at Government Polytechnic, Kolhapur -

- Year of award of academic autonomy : 1992 Year of award of MPECS and Flexibility : 1994 Government Polytechnic, Kolhapur is the first Government Polytechnic in Maharashtra to have been awarded academic autonomy
- Bodies and Cells under Academic Autonomy :
 - i) Governing Body
 - ii) Board of Studies
 - iii) Programme-wise Boards of Studies
- Examination Committee Curriculum Revisions under Autonomy : 1992, MPECS-2001, MPECS-2006, MPECS-2010, MPECS-2013, MPECS-2016
- Award of Diploma in Convocation Ceremony every year



2. VISION, MISSION, PROGRAMME EDUCATIONAL OBJECTIVES (PEOs), PROGRAMME OUTCOMES (POs) AND PROGRAMME-SPECIFIC OUTCOMES (PSOs)

Vision of Institute:

Institute of high recognition developing competent technicians for quality services or entrepreneurship to cater the needs of industry and society.

Mission of Institute:

- To educate and train in multi-disciplinary multi-level programmes to develop technicians and skilled manpower having global competency
- To ensure employability, encourage entrepreneurship, promote lifelong learning
- To inculcate in the students the qualities of a good citizen at individual, social and professional level
- To provide quality management system with focus on effective student-centric education
- To utilize faculty expertise and Institute infrastructure to render quality consultancy services

Vision of Mechanical Engineering Programme:

Internationally recognized programme for development of mechanical engineering technicians providing platform for entrepreneurship and incubation for industry of the country.

Mission of Mechanical Engineering Programme:

- To educate and train students for employment or entrepreneurship or higher education in mechanical engineering
- To provide student centric learning system having focus on development of global professional competency
- To inculcate elements of holistic personality, responsible citizenship and social concern

Programme Educational Objectives(PEOs):

Within three years of Diploma, students are able to –

- 1. Be employed as a practicing engineer in the fields of manufacturing and service sectors.
- 2. Assume positions of leadership and responsibility within an organization.
- 3. Progress through higher education and certificate programs in Engineering and other professionally related fields.
- 4. Startup own service or manufacturing enterprise.
- 5. Apply a set of moral principles to all interactions with stakeholders.

Programme Outcomes (POs)

- 1. **Basic knowledge**: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
- 2. **Discipline knowledge**: An ability to apply discipline specific knowledge to solve core and/or applied engineering problems.
- 3. **Experiments and practice**: An ability to plan and perform experiments and practices and to use the result to solve engineering problems.
- 4. **Engineering tools**: Apply appropriate technologies and tools with an understanding of the limitations.
- 5. **The engineer and society**: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
- 6. **Environment and sustainability**: Understand the impact of engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
- 7. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 8. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- 9. **Communication**: An ability to communicate effectively.
- 10. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in context of technological changes.

Programme Specific Outcomes (PSOs)

- 1. Learner will be able to work in manufacturing and service sectors as a production supervisor, quality inspector, design and drafting assistant, maintenance engineer, planning assistant.
- 2. Start entrepreneurial activity in the Mechanical Engineering field.

Job profiles and related Competencies for the diploma holder

The curriculum for mechanical engineering Programme is primarily developed with the focus on small, medium size mechanical engineering enterprises & large size organization in & around the region. The enterprises will be production, manufacturing, sales, repairs & maintenance, services to the community etc. The enterprises may be private sector, public sector govt. sector where diploma holders in mechanical engineering may work as supervisor, technician, junior engineering, assistant manager or he may become an entrepreneur.

The main aims of mechanical engineering programme are to induce the following qualities in the diploma holders.

SOCIAL SKILLS

- 1) To be a good citizen.
- 2) Answer question and proposals in appropriate manner.
- 3) Prepare impact instructions to pears/subordinates.
- 4) Write letter, report & proposals in appropriate manner.
- 5) Develop an attitude to work in team for achieving goals.
- 6) Develop listening skill and respect for other operations.

- 7) To learn how to use library literature and gathering of information.
- 8) Develop skill to work independently for problem solving.
- 9) To develop creative thinking.
- 10) Awareness of Government Rules.

TECHNICAL SKILLS

- 1) Apply problem solving models to arrive at proper solutions of technical problems.
- 2) Develop supervisory and managerial skills.
- 3) Use of different types of measuring instrument.
- 4) Use of statistical quality control techniques used in industries.
- 5) Apply decision making techniques.
- 6) Detect faults and repairs of mechanical units.
- 7) Design machine parts by applying standard design procedure.
- 8) Selection of different types of materials.
- 9) Calculation of standard time.
- 10) Conduct time study and method study by using standard methods.
- 11) Preparing process sheets & flow charts.
- 12) Selection of different types of cutting tools.
- 13) Selection of machining parameters.
- 14) Selection of different types of lubricants & coolants.
- 15) Selection of various machines tools.
- 16) Design of simple jigs & fixtures.
- 17) Draw, read, interpret working drawings.
- 18) Use of PERT & CPM techniques.
- 19) Prepare simple program for CNC machine.
- 20) Use of various safety devices.
- 21) Estimating product cost.
- 22) Preparation of Project report.
- 23) Market Survey.
- 24) Selection of Engines for different application.
- 25) Load calculations for refrigeration and air conditioning systems.
- 26) Selection of various parts and equipments used for different refrigeration and air conditioning systems.
- 27) Detect and rectify the faults of refrigeration and air conditioning.
- 28) Use of Garage tools and maintenance.
- 29) Calculate performance characteristics of I.C. Engines and Hydraulic machineries.
- 30) Use of drafting software.
- 31) Prepare simple computer program and execute.
- 32) Elementary exposure to ISO.

Aims of Mechanical Engineering Programme are prepared in order to have various technical skills and abilities to be acquired by the diploma holders in mechanical engineering, so that he can fulfill industrial requirements precisely.

Considering these aims, the contents of Mechanical Engineering Program is divided in five levels. In First level, Students will be exposed to introductory aspects of foundation courses, like mathematics, engineering drawing, science, Workshop Practice etc. From this level, students will acquire basic knowledge of above said courses which is required for higher levels. Second level is Life Skills and Professional Skills Courses which covers Generic Skills, Communication Skill, Professional Practices and Environmental Engineering which impart students to acquire social and professional skill.

Third level is of basic technology courses which are prepared to induce necessary skills and knowledge and abilities of different Mechanical Courses like power engineering, machine drawing, manufacturing processes, machine tools, engineering metallurgy, mechanisms etc. The contents of basic technology level are helpful to develop the skills, abilities, and knowledge of basic of thermodynamics, steam engineering, machine drawing, manufacturing processes, metallurgy, machine tools and calculations of stresses and strains in different machine members.

Fourth level is applied technology courses. Contents of this level is so structured so as to impart skills, abilities and knowledge of advanced mechanical engineering courses like machine design, hydraulic machinery, metrology and quality control. Students are also exposed to specialized fields like maintenance, instrumentation and CNC machines.

Fifth level is Management and diversified courses. This level is designed to develop managerial skills and abilities amongst students. It also includes specialized courses like industrial engineering, foundry technology, automobile engineering. Entrepreneurship course is also included to promote entrepreneurial attitude among students.

Contents of all five level courses are structured in sequential and logical manner so as to cover cognitive, psychomotor, and affective domains of learning.

3. OVERVIEW AND SALIENT FEATURES OF CURRICULUM: MPECS-2016

Total N	lo. of	f Credits	180							
No. of		Total	39							
courses	5	Theory	20							
offered		· ·	30							
Max. no). COl	irses in a	08							
St Tatal M	emes		4400							
I otal Ma	$\frac{1}{1}$	uin Marks	4400							
Courses	1n	INO.	10							
Level IV	and	Credits	/1							
V		Marks	1600							
Courses	in	No.	09							
Level	[Credits	44							
		Marks	975							
Courses	in	No.	03							
I evel I	T	Credits	11							
	1	Marks	225							
Courses	:	No.	11							
	III IT	Credits	54							
Level I	ш 	Marks	1600							
C	•	No.	10							
L ourses	1n V	Credits	46							
Lever	v	Marks	950							
Courses	in	No.	06							
L ovel V	111 7	Credits	25							
Level	/	Marks	650							
%Ratio of	N	/larks-wise	70% : 30%							
Th:Pr	C	Credit-wise	52%:48%							
No. of A	Allied	l Courses	02							
Optional	No.	of courses	04							
Courses	Courses Optional		03							
No. of		Internal	05							
Practica Exams	1	External	02							
No. of Or	al	Internal	01							
Exams		External	08							

3.1 Overview of Curriculum MPECS-2016

Diploma shall be awarded on the basis of marks obtained in Level IV and Level V courses

3.2 Salient Features of Curriculum MPECS-2016

Addition and deletion of Courses with respect to MPECS-2013:

- In the first semester the course entitled "Fundamentals of Mechanical Engineering" is deleted. This is because the content of this course was vast and it is hard for first year students to digest. However the content of the course in-depth is covered in different courses of Mechanical Engineering from second year of Diploma
- 2. In the course "Manufacturing processes" following are the changes
 - Metallic and other materials used for pattern is incorporated.
 - -The topic on "Plastic Moulding" is removed
 - -One practical on moulding and casting is added
- 3. In the course "Machine tools" following are the changes
 - -Centrifugal casting bit is removed

-From the Topic "Grinding" the bits, Selection of grinding wheels, Cast factors, variable factors removed.

- 4. In the course "Advance Machining Processes" following are the changes
 - The topic "Transfer machines" is removed
 - Bit on milling tools is added
 - Bit on CNC universal turning is added
- 5. In the course "Metrology and Quality control" following are the changes
 - The sub topic "Sine bar" is removed
 - Bit on digital 2D height master is added.
 - -Bit on CMM is added
- 6. In the course "Power Engineering" following are the changes
- The topic "Refrigeration and Air Conditioning" is added in section II.
- 7. In the course "Engineering Materials and Metallurgy" following are the changes
- The sub topic on nonmetallic materials is added.

Major modifications in Course Contents with respect to MPECS-2013:In the first and second level common subjects like Engineering Physics about 10% of the content is modified inclining towards the Mechanical Engineering applications. This is required to understand the further courses of Mechanical Engg. with ease.

Changes in Implementation Strategy and Treatment with respect to MPECS-2013: In MPECs 2013 curriculum there were 15 elective subjects equally arranged in five groups out of that four groups is to be continued in MPECs 16 and the subject "Industrial Engineering" is to be made compulsory from dropped out group.

Other salient features :The 04 credits recovered from the deletion of the course "Fundamentals of Mechanical Engineering" is utilized by increasing the credits for the first semester course entitled "Workshop Practice - I" by 2 credits, Fourth semester course entitled "Engg. Metallurgy and Materials" by 1 credit and Sixth semester course "Metrology" by 1credit. Also 2 credits available from omission of Environmental Studies course is allotted one credit each to Power engg. and Manufacturing Processes course.

Vacational training of 4 weeks and 2 weeks shall be made compulsory to all students after fourth semester and fifth semester respectively.

4. TEACHING AND EXAMINATION SCHEME (LEVEL-WISE)

S	Name of Course	Course	Course Abbrevi	L e v	Pre- requi-	Teaching Scheme (hours per week)			Examination Scheme (marks)				
N		Code	ation	e L	site Course	Th	Pract. / Drg. / Tut	Cr	Th	TS	TW	Pr	Or
	Level 1: Foundation Courses												
1	Engineering Physics	CCF101	FPHA	1	-	04	02	06	80	20		50I	
2	Chemistry of Engineering Materials	CCF103	FCHA	1	-	04	02	06	80	20		50I	
3	Basic Mathematics	CCF105	FBMT	1	-	03	01	04	80	20			
4	Engineering Mathematics	CCF106	FEMT	1	CCF105	03	01	04	80	20			
5	Engg.Drawing-1	CCF107	FEDA	1		02	04	06	80	20	25I		
6	Engg.Drawing-2	CCF108	FEDB	1	CCF107	02	04	06	80	20	25I		
7	Applied Mechanics	CCF110	FAPM	1		04	02	06	80	20	25I		
8	Workshop Practice-1	CCF112	FWSB	1			04	04			50I		
9	Workshop Practice-2	CCF116	FWSF	1	CCF112		02	02			50I		
	Level 2 : Life Skills and Professional Skil	ls Courses	1										
10	Generic Skills	CCF201	FGNS	2		02	02	04			25I	50I	
11	Communication Skills	CCF202	FCMS	2		02	02	04	40	10		25I	
12	Professional Practices	CCF203	FPRP	2		01	02	03			25I		50I
	Level 3: Basic Technology Courses												
13	Applied Mathematics	MEF301	FAMT	3	CCF106	03	01	04	80	20			
14	Thermal Engineering	MEF302	FTEG	3		03	02	05	80	20	251		25E
15	Machine Drawing	MEF303	FMDR	3	CCF108	03	02	05	80	20	251		50E
16	Manufacturing Processes	MEF304	FMPK	3		03	04	07	80	20	251	50E	
1/	Incory of Engg. Design	MEF305	FIED	3	CCF110 MEE204	03	02	05	80	20	251		
18	Machine Tools	MEF300	FMIL	3	MEF304	02	04	00	80	20	251	JUE	
20	Theory of M/Cs and Machanism	MEE209	FAEA ETMM	2		02	02	04	80	20	231 501		 25E
20	Flectrical Technology	MEE300		3		03	02	03	80	20	251		ZJE
21	Enga Matallurgy and Materials	MEE309	FELI	3		02	02	04	80	20	231 501		
22	Elective $1 < MEE311$ TO MEE313	WILL'STU	TENTIN	3		03	02	0.0	80	20	251		
23	Level 4: Applied Technology Courses			5		02	02	04	00	20	2.51		
24	Power Engineering	MEF401	FPEG	4	MEE302	04	02	06	80	20	-	-	25E
25	Machine Design	MEF402	FMDN	4	MEF305	03	02	05	80	20	_	-	25E
26	Advanced Machining Processes	MEF403	FAMP	4	MEF306	02	04	06	80	20	25I	-	-
27	Project- I	MEF404	FPRT	4		-	02	02	-	-	25 I	-	-
28	Project – II	MEF405	FPRO	4	MEF404	-	04	04	-	-	25 I	-	50E
29	Hydraulic Machinery	MEF406	FHYM	4	-	03	02	05	80	20	25 I	-	-
30	Metrology	MEF407	FMQC	4	-	03	02	05	80	20	25I	-	-
31	Computer Programming	MEF408	FCPR	4	-	02	02	04	-	-	50 I	-	-
32	Computer Applications	MEF409	FCPA	4	-	02	02	04	-	-	25 I	25I	-
33	Elective-2 < MEF410 TO MEF412>		FPEG	4	-	03	02	05	80	20	25 I	-	-
	Level 5: Management and Diversified Te	chnology C	ourses										
34	Industrial Org. And Management	CCF501	FIOM	5	-	03	-	03	80	20	-	-	-
35	Entrepreneurship Development	MEF501	FEDP	5	-	01	02	03	-	-	50 I	-	-
36	Quality Management	MEF502	FQLM	5	-	02	02	04	80	20	25 I	-	-
37	Industrial Engineering	MEF503	-	5	-	03	02	05	80	20	25 I	-	-
38	Elective-3< MEF504 TO MEF506>		-	5	-	03	02	05	80	20	-	-	25E
39	Elective-4< MEF507 TO MEF509>		-	5	-	03	02	05	80	20	-	-	25E

Optional Courses for Electives

				I.	Pre-	Teaching Scheme (hours per week)			Examination Scheme (marks)				
S N	Name of Course	Course Code	Course Abbrev iation	e v el	requi- site Course	Th	Pra ct. / Drg. / Tut oria l	Cr ed its	Th	TS	TW	Pr	Or
Elect	ive – 1 (ANY ONE) :	. Group											
1	Pollution control	MEF311	FPCL	3		02	02	04	80	02	25I		
2	Non-Conventional Energy Sources	MEF312	FNCE	3		02	02	04	80	20	25I		
3	Higher Mathematics	MEF313	FHMT	3		02	02	04	80	20	25I		
Elect	ive – 2 (ANY ONE) :	Group	-										
4	Mech Measurement & Mechatronics	MEF410	FMMM	4		03	02	05	80	20	25I		
5	Marketing Management	MEF411	FMGM	4		03	02	05	80	20	25I		
6	Quality Systems	MEF412	FQLS	4		03	02	05	80	20	25I		
Elect	ive – 3 (ANY ONE) :	Group				1	r		1	1	r		
7	Foundry Technology	MEE504	FFTL	5	-	03	02	05	80	20	-	-	25E
8	Refrigeration & Air conditioning	MEF505	FRAC	5		03	02	05	80	20			25E
9	Automobile Engineering	MEF506	FAEG	5		03	02	05	80	20			25E
Elect	ive – 4 (ANY ONE) :	Group											
10	Industrial Hydraulics & Pneumatics	MEF507	FIHP	5		03	02	05	80	20			25E
11	Tool Engineering	MEF508	FTLG	5		03	02	05	80	20			25E
12	Welding Technology	MEF509	FWLT	5		03	02	05	80	20			25E

5. PATH-WISE COURSE STRUCTURES Path-wise Course Structure Path-1 : Students admitted to First Year - X std. and X std. Tech pass outs

				I		Tea	aching Sch	neme]	Exami	nation	Schen	ne
SD		Course	Course		Pre-	(h	ours per we	eek)			(Mark	s)	
NO	Name of Course	Course	Abbrevi	е	requi-site		Pract. /	C			т		
NO		Code	ation	v al	Course	Th	Drg. /		Th	TS	1	Pr	Or
				ei			Tutorial	aits			w		
	Semester 1												
1	Chemistry of engineering materials	CCF103	FCHA	1	-	04	02	06	80	20	-		50 I
2	Basic Mathematics	CCF105	FBMT	1	-	03	01	04	80	20	-		-
3	Engg. Drawing- 1	CCF107	FEDA	1	-	02	04	06	80	20	25 I		-
4	Workshop Practice-1	CCF112	FWSB	1	-	-	04	04	-	-	50 I		-
5	Generic Skill	CCF201	FGNS	2	-	02	02	04	-	-	25 I		50E
	Semester 2												
6	Engineering Physics	CCF101	FPHA	1	-	04	02	06	80	20			50 I
7	Engineering Mathematics	CCF106	FEMT	1	CCF105	03	01	04	80	20	-		-
8	Engg.Drawing-2	CCF108	FEDB	1	CCF107	02	04	06	80	20	25 I		-
9	Applied Mechanics	CCF110	FAPM	1	-	04	02	06	80	20	25 I		-
10	Communication Skill	CCF202	FCMS	2	-	02	02	04	40	10	-		25 I
11	Workshop Practice-2	CCF116	FWSF	1	CCF112	-	02	02	-	-	50 I		-
	Semester 3												
12	Applied Mathematics	MEF301	FAMT	3	CCE106	03	01	04	80	20			-
13	Machine Drawing	MEF303	FMDR	3	CCE108	03	02	05	80	20	25I		50E
14	Manufacturing Processes	MEF304	FMPR	3	-	03	04	07	80	20	25 I	50 E	
15	Theory of Engg. Design	MEF305	FTED	3	CCF110	03	02	05	80	20	25 I		-
16	Electrical Technology	MEF309	FELT	3	-	02	02	04	80	20	25 I		-
17	Computer Programming	MEF408	FCPR	4	-	02	02	04	-	-	50I		-
	Semester 4												
18	Thermal Engineering	MEF302	FTEG	3	-	03	02	05	80	20	25I		25E
19	Machine Tools	MEF306	FMTL		MEF304	02	04	06	80	20	25 I	50E	
20	Applied Electronics	MEF307	FAEX	3	-	02	02	04	80	20	25 I		-
21	Theory of M/Cs and Mechanism	MEF308	FTMM	3	-	03	02	05	80	20	50I		25E
22	Engg. Metallurgy and Materials	MEF310	FEMM	3	-	03	02	05	80	20	50 I		-
23	Computer Applications	MEF409	FCPA	4	-	02	02	04	-	-	25 I	25I	
24	Professional Practices	CCF203	FPRP	2	-	01	02	03	-	-	25 I		50E
25	Elective-1< MEF311 TO			3	_	02	02	04	80	20	25 I		_
25	MEF313>(Any One)		_	5	_	02	02	04	00	20	25 1		-
	Semester 5												
26	Power Engineering	MEF401	FPEG	4	MEF302	04	02	06	80	20	-		25E
27	Machine Design	MEF402	FMDN	4	MEF305	03	02	05	80	20	-		25E
28	Advanced Machining Processes	MEF403	FAMP	4	MEF306	02	04	06	80	20	25I		-
29	Project- I	MEF404	FPRT	4	-	-	02	02	-	-	25 I		-
30	Hydraulic Machinery	MEF406	FHYM	4	-	03	02	05	80	20	25 I		-
31	Industrial Engineering	MEF503	-	5	-	03	02	05	80	20	25I	-	-
32	Elective-2< MEF410 TO	-	-	4	-	03	02	05	80	20	25 I		-
	MEF412>(Any One)					00	02		00	20	201		
	Semester 6												
33	Project- II	MEF405	FPRO	4	MEF404	-	04	04	-	-	25 I		50E
34	Metrology	MEF407	FMQC	4	-	03	02	05	80	20	25I		-
35	Entrepreneurship Development	MEF501	FEDP	5	-	01	02	03	-	-	50 I		-
36	Industrial Org. And Management	CCF501	FIOM	5	-	03	-	03	80	20	-		-
37	Quality Management	MEF502	FQLM	5	-	02	02	04	80	20	25 I		-
38	Elective-3< MEF504 TO MEF506> (Any One)	-	-	5	-	03	02	05	80	20	-		25E
20	Elective-4< MEF507 TO MEF509>			~		02	02	05	00	20	1		0 (TE
39	(Any One)	-	-	З	-	03	02	05	80	20	-		25E

Path-wise Course Structure

Path-2: Students admitted directly to Second Year with XII Science (PCM/PCMB)

~		~	Course	Le	Pre-	Tea (he	oching Sche	eme ek)	Examination Scheme (Marks)				
S N	Name of Course	Course Code	Abbrevi ation	ve l	requi- site Course	Th	Pract. / Drg. / Tutorial	Cr edi ts	Th	TS	тw	Pr	Or
	Semester 3												
1	Engg.Drawing-1	CCE107	EEDA	1	-	02	04	06	80	20	25 I	-	-
2	Applied Mechanics	CCE110	EAPM	1	-	04	02	06	80	20	25 I	-	-
3	Applied Mathematics	MEE301	EAMT	3	CCE106	03	01	04	80	20		-	-
4	Manufacturing Processes	MEE304	EMPR	3	-	03	04	07	80	20	25 I	50E	-
5	Electrical Technology	MEE309	EELT	3	-	02	02	04	80	20	25 I	-	-
	Semester 4												
6	Engg.Drawing-2	CCE108	EEDB	1	CCE107	02	04	05	80	20	25 I	-	-
7	Theory of Engg. Design	MEE305	ETED	3	CCE110	03	02	05	80	20	25 I	-	-
8	Thermal Engineering	MEE302	ETEG	3	-	03	02	05	80	20	25I	-	25E
9	Machine Tools	MEE306	EMTL	3	MEE304	02	04	06	80	20	25 I	50 E	-
10	Applied Electronics	MEE307	EAEX	3	-	02	02	04	80	20	25 I	-	-
11	Theory of M/Cs and Mechanism	MEE308	ETMM	3	-	03	02	05	80	20	50 I	-	25E
12	Engg. Metallurgy and Materials	MEE310	EEMM	3	-	02	02	04	80	20	50 I	-	-
13	Professional Practices	CCE203	EPRP	2	-	01	02	03	-	-	25 I	-	50I
14	Elective-1 < MEE311 TO MEE313> (Any One)	-	-	3	-	02	02	04	80	20	25 I	-	-
	Semester 5												
15	Machine Drawing	MEE303	EMDR	3	CCE108	03	02	05	80	20	25I	-	50E
16	Power Engineering	MEE401	EPEG	4	MEE302	04	02	06	80	20	-	-	25E
17	Advanced Machining Processes	MEE402 MEE403	EMDN	4	MEE305 MEE306	03	02	05	80	20	- 251	-	23E
19	Project- I	MEE403	EPRT	4	-		04	02	-		25 I	-	-
20	Hydraulic Machinery	MEE406	EHYM	4	-	03	02	05	80	20	25 I	-	-
21	Elective-2 <mee410 mee412="" to=""> (Any One)</mee410>	-	-	4	-	03	02	05	80	20	25 I	-	-
22	Elective-3 <mee504 mee506="" to=""> (Any One)</mee504>	-	-	5	-	03	02	05	80	20		-	25E
24	Computer Programming	MEE408	ECPR	4	-	02	02	04	-	-	50 I	-	-
	Semester 6												
25	Project- II	MEE405	EPRO	4	MEE404	-	04	04	-	-	25 I	-	50E
26	Metrology	MEE407	EMQC	4	-	03	02	04	80	20	25I	-	-
27	Entrepreneurship Development	MEE501	EEDP	5	-	01	02	03	-	-	50 I	-	-
28	Industrial Org. And Management	CCF501	EIOM	5	-	03	-	03	80	20	-	-	-
29	Quality Management	MEE502	EQLM	5	-	02	02	04	80	20	25 I	-	-
30	Elective-4 < MEE507 TO MEE509> (Any One)	-	-	5	-	03	02	05	80	20	-	-	25E
31	Computer Applications	MEE409	ECPA	4	-	02	02	04	-	-	25 I	25 I	-

Note : Separate Supplementary Input Sessions for necessary content of First Year courses shall be designed and arranged for these students so as to bridge the gap of FY courses

6. EXEMPTIONS FOR COURSES

Eligibility for Exemptions for First and Second Semester Courses of MPECS-2016 for students admitted on X-pass basis

			Whether eligible for exemption?								
S	Name of Course	Course		((Yes/No)					
Ν	Name of Course	Code	XII	XII	XII	XII	тт				
			Science	Tech.	MCVC	Voc.					
1	Engineering Physics (CE/ME/SM/MT)	CCF101	YES	YES	No	No	No				
2	Engineering Physics (EE/IE/ET/IT)	CCF102	YES	YES	No	No	No				
3	Engineering Chemistry (CE/ME/SM/MT)	CCF103	No	No	No	No	No				
4	Engineering Chemistry (EE/IE/ET/IT)	CCF104	No	No	No	No	No				
5	Basic Mathematics	CCF105	YES	YES	No	YES	No				
6	Engineering Mathematics	CCF106	YES	YES	No	YES	No				
7	Engineering Drawing-1 (CE/ME/MT)	CCF107	No	YES	No	No	No				
8	Engineering Drawing-1(SM)	CCF117	No	YES	No	No	No				
9	Engineering Drawing-2 (CE/ME/SM/MT)	CCF108	No	YES	No	No	No				
10	Engineering Graphics (EE/IT/ IE/ET)	CCF109	No	YES	No	No	No				
11	Applied Mechanics	CCF110	No	No	No	No	No				
12	Workshop Practices–1 (CE)	CCF111	No	YES	YES	YES	YES				
13	Workshop Practices–1 (ME, SM,MT)	CCF112	No	YES	YES	YES	YES				
14	Workshop Practices (EE)	CCF113	No	YES	YES	YES	YES				
15	Workshop Practices (IE, ET)	CCF114	No	YES	YES	YES	YES				
16	Workshop Practices -2 (CE)	CCF115	No	YES	YES	YES	YES				
17	Workshop Practices -2 (ME, SM,MT)	CCF116	No	YES	YES	YES	YES				
18	Generic Skills	CCF201	No	No	No	No	No				
19	Communication Skills	CCF202	No	No	No	No	No				

Note: The above eligibility is subject to condition that the student has secured at least 40 % marks in the respective subject.

Students seeking exemption for any other subjects should contact Academic Coordinator / Controller of Examinations.

7. COURSE EQUIVALENCE FOR PREVIOUS MPECSs

SN	MPECS-1994	MPECS-2001	MPECS-2006	MPECS-2010	MPECS-2013	MPECS-2016
1			R101-Generic Skill	X101-Generic Skill	CCE201-Gen Skills	CCF201-Gen Skills
2.	101-Comm.Skill	0101-Com.SkllI	R102-Comm.Skills	X106-Comm.Skills	CCE202-Com Skills	CCF202-Com Skills
3		0102		X106	CCE202 Communication	CCF202 Communication
5	102 Communication	Communication	R102 Communication	Communication	Skill	Skill
	skill –II	skill -II	skills	Skills	5km	5km
4		0103 Applied	R103 Applied		CCE101	CCF101
	103 Applied Physics	nhysics-I	Physics-I	X102 Basic Physics	Engineering Physics	Engineering Physics
	100 r ppilou r nybiob	0104 Applied	R104 Applied	X108 Applied	Lingineering Tinjores	Lingineering Tinystes
		physics -II	Physics -II	Physics		
5		0103 Applied	R103 Applied	X102 Basic	CCE103	CCF103
5	103 Applied	Chemistry-I	Chemistry-I	Chemistry	Chemistry of Engineering	Chemistry of Engineering
	Chemistry	0104 Applied	R104 Applied	X108 Applied	materials	materials
		Chemistry -II	Chemistry-II	Chemistry		
6		0107	D107 D:-	V104 D:-	CCE105 Basic	CCF105 Basic
	105 Mathematics-I	Mathematics-	K10/ Basic	A104 Basic	Mathematics	Mathematics
		I	Mathematics	Mathematics		
	106 Mathematics	0108	P108 Engineering	V110 Engineering	CCE106	CCF106
7	100 Manematics-	Mathematics-	Mathematics	ATTO Engineering Mathematics	Engineering Mathematics	Engineering Mathematics
	11	-II	Maulematics	Watternatics		
8	107 Applied	0116 Applied	R112 Applied	X111 Applied	CCE110 Applied	CCF110 Applied
	Mechanics	Mechanics	Mechanics.	Mechanics	Mechanics	Mechanics
9	109 Introduction to	0115 Introduction	R111 Computer		NIL	NIL
		to	Fundamentals &	NIL		
	Computers	Computers	Application.			
10	109 Engineering	0109 Engineering	R109 Engineering	X105 Engineering	CCE107 Engineering	CCF107 Engineering
	Drawing-I	Drawing-I	Drawing-I	Drawing-I	Drawing-1	Drawing-1
11	110 Engineering	0110 Engineering	R110 Engineering	X107 Engineering	CCE108 Engineering	CCF108 Engineering
	Drawing-II	Drawing-II	Drawing-II	Drawing-II	Drawing-2	Drawing-2
		0113 Workshop	P113 Workshop	ME101 Basic	CCE112 Workshop	CCF112 Workshop
12	111 Workshop-I	I I I I I I I I I I I I I I I I I I I	Practice-I	Workshop Practice	Practice-1	Practice-1
		1	Tiactice-I	(Mechanical)		
		0114 Workshop -	R114 Workshop	ME102 Workshop	CCE116 Workshop	CCF116 Workshop
13	112 Workshop-II	П	Practice-II	Practice	Practice-2	Practice-2
			Thethee H	(Mechanical)		
14		0111 Fundamentals				
		of	NIL	NIL		NIL
		Engineering-I			MEE101 Fundamental	
15		0112			of Mechanical	
		Fundamentals	NIL	NIL	Engineering	NIL
		of Engineering-				
16		11				
16	M201 Mathematics-	2201	M201 Applied	ME201 Mathematics	MEE301 Applied	MEF301 Applied
	III	Mathematics-	Mathematics		Mathematics	Mathematics
17	M202 D	-III 2202 Tharman	M202 The sum of	ME202 The sum of	MEE202 Thermost	MEE202 The sum of
17	M202 Power	2202 Thermal	M202 Thermal	ME202 Therman	MEE302 Thermal	MEF502 Thermal
10	M202 Maabina	2202 Machine	M202 Maching	ME202 Mashina	MEE202 Machine	MEE202 Machine
10	Drawing I	2205 Machine Drawing	Drawing	Drawing	Drawing	Drawing
10	Diawing-1	2204	Diawing	ME204	MEE304 Menufacturing	MEE304 Manufacturing
17	M204 Manufacturing	2204 Manufacturing	M204 Manufacturing	Manufacturing	Processes	Processes
	Process-I	Processes	Processes	Processes	110005505	11000300
		2205 Theory of	M205 Theory of	ME205 Theory of \	MEE305 Theory of	MEF305 Theory of
20	M205 Strength of	Engineering	Engineering	Engineering	Engineering	Engineering
20	Materials	Design	Design	Design	Design	Design
21	M206 Machine	2206 Machine	M206 Production	ME206 Production	MEE306 Machine	MEF306 Machine
	Tools -I	Tools	Processes	Processes	Tools	Tools
22	M207 Machine	2207 Production		11000505.		
	Drawing- II	Drawing	NIL	NIL	NIL	NIL
			M208 Theory of	ME208 Theory of	MEE308 Theory of	MEF308 Theory of
23	M208 Mechanisms	2208 Mechanisms	Machines &	Machines &	Machines &	Machines &
-			Mechanisms.	Mechanisms.	Mechanisms.	Mechanisms.
24		2209 Electrical	M209 Electrical	ME209 Electrical	MEE309 Electrical	MEF309 Electrical
		Technology	Technology	Technology	Technology	Technology
25	M209 Engineering	2211 Engineering			-	-
-	Materials	Materials				
26	M210 Heat	2212 Heat			-	-
	Transfer	Transfer				
	M211 En -	2012 En	M210 Engineering	ME210 Engineering	MEE310 Engg.	MEF310 Engg.
27	Mat 1	2213 Engineering	Materials &	Materials &	Metallurgy and	Metallurgy and
	Metallurgy	Metallurgy	Metallurgy	Metallurgy	Materials	Materials
-						

28			M207 Applied	ME207 Applied	MEE307 Applied	MEF307 Applied
			Electronics.	Electronics.	Electronics	Electronics
29			M211 Personality	ME211 Personality	CCE203 Professional	CCF203 Professional
			Development.	Development.	Practices	Practices
30	221 Basic Civil Engg.	0221 Elements Of Civil Engg.	R221 Elements Of Civil Engg.			
31	222 Basic Electrical Engg.	0222 Electrical Circuits & Machines	R222 Electrical Circuits & Machines.			
32	223 Basic Electronics.	0223 Basic Electronics.	R223 Basic Electronics.			
33	224 Basic Mechanical Engg.	0224 Basic Mechanical Engg.	R224 Basic Mechanical Engg.		MEE101 Fundamental of Mechanical Engg	
34	225 Basic Sugar Manufacturing.	0225 Basic Sugar Manufacturing.	R225 Basic Sugar Manufacturing.		-	-
35	226 Pollution Control	0226 Pollution Control	R226 Pollution Control	ME212 Pollution Control	MEE311 Pollution Control	MEF311 Pollution Control
36	227 Non- Conventional energy sources.	0227 Non- Conventional Energy Sources.	R227 Non- Conventional energy Sources.	ME213 Non- Conventional energy Sources.	MEE312 Non- Conventional Energy Sources	MEF312 Non- Conventional Energy Sources
37	228 Higher Mathematics	0228 Higher Mathematics	R228 Higher Mathematics	ME214 Higher Mathematics	MEE313 Higher Mathematics	MEF313 Higher Mathematics
38	M301 Power Engineering-II	2301Power Engineering	M301Power Engineering	ME301Power Engineering	MEE401 Power Engineering	MEF401 Power Engineering
39	M302 Machine Design	2302Machine Design	M302Machine Design	ME302Machine Design	MEE402 Machine Design	MEF402 Machine Design
40	M303 Machine Tools –II	2305CNC Machine Tools	M303Advance Machining Processes.	ME303Advance Machining Processes.	MEE403 Advanced Machining Processes	MEF403 Advanced Machining Processes
41	M304 Project Work & Seminar		M304 Seminar	ME304 Seminar	MEE404 Project- I	MEF404 Project- I
42		2304Industrial Project	M305 Project	ME305 Project	MEE405 Project- II	MEF405 Project- II
43			M306Hydraulic Machinery.	ME306 Hydraulic Machinery.	MEE406 Hydraulic Machinery	MEF406 Hydraulic Machinery
44			M308 Career & entrepreneurship Development	ME308 Career and Entrepreneurship Development	MEE501 Entrepreneurship Development	MEF501 Entrepreneurship Development
45	M305 Plant Maintenance Engineering	2306Plant Maintenance Engineering			-	-
46	M 306 Hydraulic Machinery	2307 Hydraulic Machinery	M306 Hydraulic Machinery	ME306 Hydraulic Machinery	MEE406 Hydraulic Machinery	MEF406 Hydraulic Machinery
47	M 307 Metrology And Quality control	2308 Metrology 2309 Quality Control	M307 Metrology M404 Quality Management	ME307 Metrology ME404 Quality Management	MEE407 Metrology MEE503 Quality Management	MEF407 Metrology MEF503 Quality Management
48	M 308 Advance Machine Tools	2303 Advance Machine Tools	M303 Advanced Machining Processes	ME303 Advanced Machining Processes	MEE403 Advanced Machining Processes	MEF403 Advanced Machining Processes
49	M 309 Instrumentation	2310 Instrumentation			-	-
50			M309 Mechanical Measurement & Mechatronics.	ME309 Mechanical Measurement & Mechatronics.	MEE410 Mech. Measurement & Mechatronics	MEF410 Mech. Measurement & Mechatronics
51			M310 Marketing Management	ME310 Marketing Management	MEE411 Marketing Management	MEF411 Marketing Management
52			M311 Alternative Energy Sources.	ME311 Alternative Energy Sources.	MEE312 Non- Conventional Energy Sources	MEF312 Non- Conventional Energy Sources
53	M401 Computer	2401 Computer	M401 Computer	ME401 Computer	MEE408 Computer	MEF408 Computer
	Programming	Programming	Programming	Programming	Programming	Programming

54	M402 Computer	2402 Computer	M402 Computer	ME402 Computer	MEE409 Computer	MEF409 Computer
~~	Application	Application	Application	Application	Application	Application
55	M403 Ind. Org. And Management	2403 Ind. Org. And Management	M403 Ind. Org. And Management	ME403 Ind. Org. And Management	MEES02 Industrial Org. And Management	MEF502 Industrial Org. And Management
56	M 404 Entrepreneurship	2404 Entrepreneurship	M308 Career & Entrepreneurship Development	ME308 Career & Entrepreneurship Development	MEE501 Entrepreneurship Development	MEF501 Entrepreneurship Development
57	M405 Production Engineering	2405 Production Engineering			-	-
58	M 406 Industrial Engineering	2406 Industrial Engineering	M405 Industrial Engineering	ME405 Industrial Engineering	MEE504 Industrial Engineering	MEF504 Industrial Engineering
59	M407 Material Management	2407 Material Management	M407 Material Management	ME407 Material Management	MEE506 Material Handling System	MEE506 Material Handling System
60	M408 Foundry Technology	2408 Foundry Technology	M408 Foundry Technology	ME408 Foundry Technology	MEE507 Foundry Technology	MEF507 Foundry Technology
61	M409 Refrigeration and Air Conditioning	2409 Refrigeration and Air Conditioning	M409 Refrigeration and Air Conditioning	ME409 Refrigeration and Air Conditioning	MEE508 Refrigeration & Air Conditioning	MEF508 Refrigeration &Air Conditioning
62	M 410 Automobile Engg.	2410 Automobile Engg.	M410 Automobile Engg.	ME410 Automobile Engg.	MEE509 Automobile Engineering	MEF509 Automobile Engineering
63	M 411 Industrial Safety	2412 Industrial Safety			-	-
64	M413 Estimation and Costing	2413 Estimation and Costing			-	-
65		2411 Industrial Hydraulics & Pneumatics.	M411 Industrial Hydraulics & Pneumatics.	ME411 Industrial Hydraulics & Pneumatics.	MEE510 Industrial Hydraulics &Pneumatic	MEF510 Industrial Hydraulics &Pneumatic
66			M404 Quality Management	ME404 Quality Management	MEE503 Quality Management	MEF503 Quality Management
67			M406 Quality Systems	ME406 Quality Systems	MEE412 Quality Systems	MEF412 Quality Systems
68			M412 Tool Engineering	ME412 Tool Engineering	MEE511 Tool Engineering	MEF511 Tool Engineering
69			M413 Welding Technology	ME413 Welding Technology	MEE512 Welding Technology	MEF512 Welding Technology

8. PROFORMAS FOR EVALUATION OF TERM WORK, ORALS AND PRACTICALS

PROFORMA - I GOVERNMENT POLYTECHNIC, KOLHAPUR Performance for Final Assessment of ORAL/PRACTICAL By Internal & External Examiner (For subject having ONLYORAL/PRACTICAL)

Course Code & Course Name--____

Programme-____

Summer/Winter Exam-____ Date-____

Roll No	Marks of	Marks of	Performance	Performance	Marks	Marks
/Exam	Progressive	Continuous	Of Term End	Of Term End	Out of	As per
No	Skill Test	Assessment	OR/PR by	OR/PR		Evaluation
			Internal	By External		Scheme
			Examiner	Examiner		
	25	25	25	25	100	

Name and Signature of Internal Examiner Name and Signature of External Examiner

PROFORMA–II GOVERNMENT POLYTECHNIC,KOLHAPUR Performance for Final Assessment of ORAL/PRACTICAL By Internal Examiner

(For subject having ONLY ORAL/PRACTICAL)

Course Code & Course Name--____

Programme-____

Summer/Winter Exam-_____Date-____

Roll No /Exam No	Marks of Progressive Skill Test	Marks of Continuous Assessment	Performance Of Term End OR/PR by Internal	Marks out of	Marks As per Evaluation Scheme
	25	25	Examiner	100	
	25	25	50	100	

Name and Signature of Internal Examiner

PROFORMA-III GOVERNMENT POLYTECHNIC,KOLHAPUR Performance for Final Assessment of TERM WORK By Internal Examiner

(For subject having ONLY TERM WORK)

Course Code & Course Name--____

Programme -_____

Summer/Winter Exam-_____Date-____

Roll No	Marks of	Marks of	Marks out of	Marks
/Exam	Progressive Skill	Continuous		As per Evaluation
No	Test	Assessment		Scheme
110	50	50	100	
	50	50	100	

Name and Signature of Internal Examiner

PROFORMA-IV GOVERNMENT POLYTECHNIC, KOLHAPUR Performance for Final Assessment of ORAL/PRACTICAL By Internal & External Examiner

(For subject having ORAL/PR&TW)

Course Code & Course Name--____

Programme-____

Summer/V	Winter Exam			_Date	
Roll No /Exam	Marks of Progressive	Performance Of Term End	Performance Of Term End	Marks out	Marks As per Evaluation
No	Skill Test	OR/PR	OR/PR	01	Scheme
		By Internal	By External		
		Examiner	Examiner		
	25	25	50	100	

Name and Signature of Internal Examiner

Name and Signature of External Examiner

PROFORMA-V GOVERNMENT POLYTECHNIC, KOLHAPUR Performance for Final Assessment of ORAL/PRACTICAL By Internal Examiner

(For subject having ORAL/PR&TW)

Course Code & Course Name--

Programme-_____

Summer/Winter Exam-_____Date-____

Roll No/ Exam No	Marks of Progressive Skill Test	Performance of Term End OR/PR By Internal Examiner	Marks out of	Marks As per Evaluation Scheme
	50	50	100	Benefite
	50	50	100	

Name and Signature of Internal Examiner

PROFORMA-VI GOVERNMENTPOLYTECHNIC, KOLHAPUR Performance for Final Assessment of TERMWORK **By Internal Examiner**

(For subject having ORAL/PR&TW)

Course Code & Course Name--

Programme-_____

Summer/Winter Exam-_____Date-____

Poll No/	Marks of Continuous	Marka out of	Marka as par
Kui Nu/		Warks out of	Fushestion Scheme
Exam No	Assessment	100	Evaluation Scheme
	100	100	

Name and Signature of Internal Examiner

(An Autonomous Institute of Government of Maharashtra)

Performa P-1 **PROJECT SHEET** (for each project)

Programme : Title of Project : Rationale of Project :

Type of project : (Product making / research / problem solving / industry based / etc.)

Uniqueness of project :

Inter-disciplinary component of project :

Process of Identification and Finalization of Topic of Project :

(Review of previous projects / Brain storming session for project ideas / Internet search for topic / Industry or field problem search, etc.)

Project Outcomes (PROs)

- 1.
- 2.
- 3.
- 4.

PRO-PO Consistency Matrix :

		Programme Outcomes POs and PSOs												
Project Outcomes (PROs)	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1	PSO2	PSO3	PSO4
1														
2														
3														

Details of Students' Group : Project Batch -

Sr.	Full name of student	Roll No	Role in the project				
No.	(Beginning with surname)	Kon 140.	General	Particular			
1.				Leader			
2.							
3.							
4.							

Detailed Planning of Project Work :

S N	Activity	Details	Date of completion
1.	Finalization of students' groups and assignment of project guide (Performa P-1)	Policy to be decided by programme department	
2.	Identification and finalization of topic (Performa P-1)	 Review of previous projects Brain storming session for project ideas Internet search for topic Industry / field problem search 	
3.	Preparation and presentation of project synopsis including project completion plan (Performa P-2)	 Synopsis ** to be submitted by group in printed form in prescribed format Synopsis to be presented by group in ppt presentation in front of faculty dean and project guide Assessment as per prescribed rubrics 	
4.	Demonstration-1 (term-1 end) (Performa P-3)	PowerPoint presentation to be assessed as per prescribed rubrics	
5.	Demonstration-2 (mid-term-2 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
6.	Presentation of final project report (Performa P-5)	 Submission of final project report with conclusion of project PowerPoint presentation Assessment as per prescribed rubrics 	
7.	Final examination	As per curriculum specifications	

**Synopsis shall contain the following :

- 1. Cover page
- 2. Index
- 3. Project Sheet
- 4. Activity schedule for project work

Name and signature of Project Guide

Name and signature of Programme Dean

(An Autonomous Institute of Government of Maharashtra)

Performa P-2 FINALIZATION OF PROJECT GROUPS, TOPICS AND GUIDES

P	rograamn	1e :	Academic Year	: Class :	Date :				
S	Project	Projec	t Group			Type of			
N N	Group	ITOJEC	loloup			Project			
N 1.	ID	Roll No.	Names of Students	Title of Project	Name of Project Guide	(Product making / research / problem solving / industry based / etc.)			
1.									
2.									
3.									
4.									
5.									
6.									
7.									
•••									

Name and signature of Programme Dean

(An Autonomous Institute of Government of Maharashtra)

Performa P-3 ASSESSMENT RUBRICS FOR SYNOPSIS OF PROJECT

Prograamme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide :

Date	:

		Performance grades and their meaning					Assessment point-wise score (out of 5) of each student						
		for each assessment point					in project group						
S N	Assessme nt point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excelle nt (5)	Roll No.: 	Roll No.: 	Roll No.: 	Roll No.:	Roll No. :	Roll No. : 	Roll No. :
1							••••	••••	••••	••••	••••	••••	••••
2													
3													
4													
5													
6													
7													
8													
9													
1													
0													
то	TOTAL SCORE >>												

Project Guide

Programme Dean

(An Autonomous Institute of Government of Maharashtra)

Performa P-4 ASSESSMENT RUBRICS FOR DEMONSTRATION-1 OF PROJECT

Prograamme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide : Date :

		Perfo	Performance grades and their meaning					Assessment point-wise score (out of 5) of each student						
		for each assessment point					in project group							
S N	Assessme nt point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excelle nt (5)	Roll No.: 	Roll No.: 	Roll No.: 	Roll No.: 	Roll No. : 	Roll No. : 	Roll No. : 	
1														
2														
3														
4														
5														
6														
7														
8														
9														
1														
0														
тс	TOTAL SCORE >>													

Project Guide

Programme Dean

(An Autonomous Institute of Government of Maharashtra)

Performa P-5 ASSESSMENT RUBRICS FOR DEMONSTRATION-2 OF PROJECT

Prograamme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide : Date :

		D 0				•							
		Performance grades and their meaning					Assessment point-wise score (out of 5) of each student						
		for each assessment point							in	project g	group		
S N	Assessme nt point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excelle nt (5)	Roll No.: 	Roll No.: 	Roll No.: 	Roll No.:	Roll No. : 	Roll No. : 	Roll No. :
1													
2													
3													
4													
5													
6													
7													
8													
9													
1													
0													
то	TOTAL SCORE >>												

Project Guide

Programme Dean
GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Performa P-6 ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECT

Prograamme :	;
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Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide : Date :

		Performance grades and their meaning				Assessment point-wise score (out of 5) of each student							
		for each assessment point			110000	in project group				<i>fuuciit</i>			
S N	Assessme nt point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excelle nt (5)	Roll No.: 	Roll No.: 	Roll No.: 	Roll No.: 	Roll No. : 	Roll No. : 	Roll No. :
1													
2													
3													
4													
5													
6													
7													
8													
9													
1													
0													
TOTAL SCORE >>													

Project Guide

Programme Dean

SECTION-II

SYLLABI OFCOURSES (LEVEL-WISE)

LEVEL – I FOUNDATION COURSES

COURSE ID:

Course Name	: ENGINEERING PHYSICS (CE/ME/SM/MT)
Course Code	: CCF101
Course Abbreviation	: FPHA

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	0.6
Practical	02	06

Evaluation Scheme :

Component	Progressive	Assessment	Semest	Total	
Component	Theory	Practical	Theory	Practical*	
Duration	Average of two tests of 20 marks each	One Skill Test (2 hours) *	One paper (3 hours)	One practical (2 hours)	
Marks	20		80	50 I	150
* Assessmen	nt as per pro-for	ma II	I – Internal	Examination	

RATIONALE:

Physics is the foundation of engineering and technology. The development of all engineering areas requires good understanding of fundamental principles in physics. Studying physics develops scientific methodology and technical aptitude in the students. Applications of principles of physics in engineering fields create interest and motivate the students.

COMPETENCY:

Apply basic science to related engineering problems.

Cognitive : i) Understanding and applying principles and laws of Physics to simple practical

Problems/ situations. ii)Observing iii) Classifying iv) Interpreting

Psychomotor: Handling of instruments, apparatus and tools.

Affective : Skill of i) working in team ii) curiosity, interest and self-confidence

COURSE OUTCOMES:

CCF101-1Describe physical properties.

CCF101-2 Use basic principles of wave motion for related engineering applications

CCF101-3Describe basics in nanotechnology for materials.

CCF101-4 Apply principles of optics, electricity to solve engineering problems

CCF101-5Demonstrate X-rays and photocell based equipment.

CCF101-6 Apply principles of acoustics and ultrasonic for related engineering applications.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Work in mfg& service sector	PSO 2 Start entrepre neurial ativity
Competency.	3	-	1	-	-	-	-	-	-	3	-	-
CCF101-1	3	-	1	-	-	-	-	-	-	3	-	-
CCF101-2	3	-	1	-	-	-	-	-	-	3	-	-
CCF101-3	3	-	1	-	-	-	-	-	-	3	-	-
CCF101-4	3	-	1	-	-	-	-	-	-	3	-	-
CCF101-5	3	-	1	-	-	-	-	-	-	3	-	-
CCF101-6	3	-	1	-	-	-	-	-	-	3	-	-

CONTENT :

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics <i>Course Outcome CCF101-1Describe physical pro</i>	Lectures (Hours)	Theory Evaluation (Marks)
1	 ELASTICITY 1.1 Definitions of elasticity, plasticity, rigidity, deforming force, restoring force 1.2 Stress, Strain and their types 1.3 Elastic Limit, Statement of Hooke's law, modulus of elasticity and its types 1.4 Behavior of wire under continuously increasing load- yield point, ultimate stress, breaking stress 1.5 Factor of safety 1.6 Applications of elasticity 1.7 Numerical problems 	06	08
2	 PROPERTIES OF LIQUID 2.1 INTRODUCTION Definitions of density, specific volume, specific weight, specific gravity, compressibility of liquid 2.2 VISCOSITY 	16 (02) (06)	18 (02) (06)

2.2.1 Definition and meaning of viscosity, velocity gradient 2.2.2 Newton's law of viscosity, Coefficient of viscosity 2.2.3 Stokes law (Derivation not required) 2.4 Derivation of expression for coefficient of viscosity of liquid by Stokes method 2.2.5 Applications of viscosity. 2.3 StuRFACE TENSION 2.3.1 Definition and molecular theory (08) 2.3.2 Angle of contact : definition and significance 2.3.3 Capillary action : definition and examples 2.3.4 Derivation of expression for surface tension by capillary rise method (experiment not required) 2.3.5 Effect of temperature and impurity on surface tension No numericals on above topic Course Outcome CCF101-2 Use basic principles of wave motion for related engineering at tension 3 WAVE MOTION 3.1 Definitions of periodic motion, Linear S. H. M. 3.2 Parameters of linear SHM 3.4 Concept and definition of wave 3.5 Parameters of wave- Frequency, periodic time, phase and wavelength 3.6 Types of waves (transverse and longitudinal) and their characteristics 3.7 Free and forced oscillations 3.8 Phenomenon of resonance and its applications No numericals on above topic Course Outcome CCF101-3Describe basics in nanotechnology for materials. 4 INTRODUCTI	Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCF101-2 Use basic principles of wave motion for related engineering3WAVE MOTION3.1 Definitions of periodic motion, Linear S. H. M.3.2 Parameters of linear SHM : Amplitudes, Period, Frequency and Phase3.3 Characteristics of linear SHM3.4 Concept and definition of wave3.5 Parameters of wave- Frequency, periodic time, phase and wavelength3.6 Types of waves (transverse and longitudinal) and their characteristics3.7 Free and forced oscillations3.8 Phenomenon of resonance and its applications No numericals on above topicCourse Outcome CCF101-3Describe basics in nanotechnology for materials.4INTRODUCTION TO NANOTECHNOLOGY 4.1 Definition of nanoscale, nanometer, nanoparticle		 2.2.1 Definition and meaning of viscosity, velocity gradient 2.2.2 Newton's law of viscosity, Coefficient of viscosity 2.2.3 Stokes law (Derivation not required) 2.2.4 Derivation of expression for coefficient of viscosity of liquid by Stokes method 2.2.5 Applications of viscosity. 2.3 SURFACE TENSION 2.3.1 Definition and molecular theory 2.3.2 Angle of contact : definition and significance 2.3.4 Derivation of expression for surface tension by capillary rise method (experiment not required) 2.3.5 Effect of temperature and impurity on surface tension 2.3.6 Applications of surface tension No numericals on above topic 	(08)	(10)
3WAVE MOTION 3.1 Definitions of periodic motion, Linear S. H. M. 3.2 Parameters of linear SHM : Amplitudes, Period, Frequency and Phase 3.3 Characteristics of linear SHM 3.4 Concept and definition of wave 3.5 Parameters of wave- Frequency, periodic time, phase and wavelength 3.6 Types of waves (transverse and longitudinal) and their characteristics 3.7 Free and forced oscillations 3.8 Phenomenon of resonance and its applications No numericals on above topic064INTRODUCTION TO NANOTECHNOLOGY 4.1 Definition of nanoscale, nanometer, nanoparticle04	Cours	e Outcome CCF101-2 Use basic principles of wave motion for related	lengineering	applications
Course Outcome CCF101-3Describe basics in nanotechnology for materials. 4 INTRODUCTION TO NANOTECHNOLOGY 4.1 Definition of nanoscale, nanometer, nanoparticle 04	3	 WAVE MOTION 3.1 Definitions of periodic motion, Linear S. H. M. 3.2 Parameters of linear SHM : Amplitudes, Period, Frequency and Phase 3.3 Characteristics of linear SHM 3.4 Concept and definition of wave 3.5 Parameters of wave- Frequency, periodic time, phase and wavelength 3.6 Types of waves (transverse and longitudinal) and their characteristics 3.7 Free and forced oscillations 3.8 Phenomenon of resonance and its applications No numericals on above topic 	06	08
4INTRODUCTION TO NANOTECHNOLOGY 4.1 Definition of nanoscale, nanometer, nanoparticle04	Cours	re Outcome CCF101-3 Describe basics in nanotechnology for material.	<i>s</i> .	
 4.2 Definition and examples of nanostructured materials 4.3 Applications of nanotechnology in electronics, automobile, textile, space, medicine, cosmetics and environment No numericals on above topic 	4 Semes	 INTRODUCTION TO NANOTECHNOLOGY 4.1 Definition of nanoscale, nanometer, nanoparticle 4.2 Definition and examples of nanostructured materials 4.3 Applications of nanotechnology in electronics, automobile, textile, space, medicine, cosmetics and environment No numericals on above topic ter end exam question paper should be such that total marks of question 	04	06

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)			
Course Outcome CCF101-4 Apply principles of optics, electricity to solve engineering problems						
5	PROPERTIES OF LIGHT	06	06			
	5.1 Refraction of light					
	5.2 Laws of Refraction of Light, Snell's law					
	5.3 Refraction through glass prism					
	5.5 Dispersion & Dispersive Power					
	5.6Numerical problems					
6	FIECTRICITY	06	08			
U	6.1 Concept of electric current resistance	00	00			
	6.2 Ohm's law Specific resistance					
	6.3 Resistances in series and parallel.					
	6.4 Wheatstone's Network and Meter Bridge.					
	6.5 Numerical problems					
	Course Outcome CCF101-5Demonstrate X-rays and photocell l	based equipmer	ıt			
7	MODERN PHYSICS	14	18			
_	7.1 PHOTO ELECTRIC EFFECT	(06)	(08)			
	7.1.1 Plank's hypothesis	(00)	(00)			
	7.1.2 Photon and its characteristics					
	7.1.3 Photo electric effect and its characteristics					
	7.1.4 Plank-Einstein equation					
	7.1.5 Photocell – construction and symbol					
	7.1.6 Applications of photo electric effect					
	7.1.7 Numerical Problems					
	7.2 LASER					
	7.2.1 Introduction of LASER	(04)	(06)			
	7.2.2 Properties of laser					
	7.2.3 Spontaneous and stimulated emission					
	7.2.5 Applications of LASER					
	No numericals on above tonic					
	7 3 X-RAVS					
	7.3.1 Nature and properties of x-rays					
	7.3.2 Production of x-rays by Coolidge tube	(04)	(04)			
	7.3.3 Applications of x-rays					
	No numericals on above topic					
Cours	e Outcome CCF101-6 Apply principles of acoustics and Ultrasonics for	related enginee	ring			
applica	ation		0			
8	ACOUSTICS AND ULTRASONICS	06	08			
	8.1 ACOUSTICS					
	8.1.1 Echo and reverberation of sound					
	8.1.2 Sabine's formula					
	8.1.3 Requirements of good acoustics					

8.1.4 Acoustical planning of an auditorium		
8.1.5 Numerical Problems		
8.2 ULTRASONICS		
8.2.1 Limits of audibility		
8.2.2 Ultrasonic waves		
8.2.3 Ultrasonic transducers : Piezoelectric and		
Magnetostriction		
8.2.4 Applications of ultrasonic waves		
No numericals on above topic		
Semester end exam question paper should be such that total marks of questions on each	ch topic is one a	and half times the

marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination :

Section		Distribution	Course	Total		
/ Topic	Name of topic	Remember	Understand	Application	Outcome	marks
no.		Remember	Onderstand	rippileution		marks
I/1	Elasticity	2	4	2	CCF101-1	08
I/2	Properties of liquids	10	6	2	CCF101-1	18
I/3	Wave motion	4	2	2	CCF101-2	08
I/4	Nanotechnology	2	4	-	CCF101-3	06
II/5	Properties of light	2	2	2	CCF101-4	06
II/6	Electricity	2	2	4	CCF101-4	08
II/7	Modern Physics	8	8	2	CCF101-5	18
II/8	Acoustics and Ultrasonics	2	4	2	CCF101-6	08
	Total	32	32	16		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B) TERM WORK Term work shall consist of the following :

Laboratory experiments and related skills to be developed :

Sr. No.	Title of Experiment	Skills to be developed	Course Outcome
1	Overview of Field	i) Information search	CCF101-1
	Applications of Physics	ii) Information presentation	То
			CCF101-6
	(Any 10 of the follo	wing experiments)	
2	To measure dimensions	i) Determine least count and zero error in the	CCF101-1
	of given objects by using	measuring instrument.	
	Vernier Caliper	11) Measuring internal and external dimensions	
		of given objects	
		iii) Handling the measuring instruments for	
		measuring depth, thickness etc.	
		iv)Tabulating observations.	
3	To measure the diameter	i) Determine least count and zero error in the	CCF101-1
	of bob and thickness of	measuring instrument.	
	plate by using	ii) Measuring dimensions of given objects	
	Micrometer screw gauge	iii)Handling the measuring instruments for	
	8	measuring depth, thickness etc.	
		iv)Tabulating observations.	

-	1		
4	To determine the	1) Measuring diameter of steel ball using	CCF101-1
	viscosity of liquid by	ii) Measuring terminal velocity of steel ball in	
	Stokes method.	the liquid column	
		iii)Use of stop watch for measurement of	
		time.	
		iv) Tabulating observations.	
5	To determine the surface	i) Focusing the microscope properly in order	CCF101-1
	tension of liquid by	to get clear image.	
	capillary rise method	ii) Adjusting cross wires of microscope at	
		particular place.	
		iii) Taking readings for main scale and	
		Vernier scale of traveling microscope.	
		iv) Tabulating observations.	005101.4
6	To measure unknown	1) Drawing the circuit diagram of the required	CCF101-4
	resistance of wire by	experiment.	
	Ammeter – Voltmeter	diagram	
	method.	iii) Measuring the value of potential	
		difference & current in the circuit	
		iv)Tabulating observations.	
7	To verify Snell's law	i) Drawing necessary ray diagram	CCF101-4
	using glass slab	ii)Measuring angles of incidence and	
		refraction	
		iii) Tabulating observations.	
8	To determine refractive	i) Removing parallax between the images and t	CCF101-4
	index of prism by pin	pins by observing the refracted ray through	
	method	prism.	
		11) Measuring the angle of refraction correctly	
		ni)Drawing the path of refracted ray through t	
		iv) Drawing inference regarding relation betwee	
		angle of incidence & angle of refraction from	
		δ graph	
		v) Tabulating observations.	
9	To determine velocity of	i)Adjusting the resonating length by	CCF101-2
1	sound by resonance tube	discriminating resonating sound from	
1		sound produced by the tuning fork.	
1		ii) Measuring internal diameter of resonating	
		tube using Vernier caliper	
		iii) Drawing inference & confirming Law nL	
		= constant	
10	To study sharest visting	iv) Labulating observations.	CCE101 5
10	10 study characteristics	i) Urawing circuit diagram	CCF101-5
		iii) Tabulating observations	
		iv) Drawing oranh	
11	To determine the	i) Measuring length of pendulum	CCF101-2
	acceleration due to	ii) Finding least count of stopwatch	
	gravity by 'g' by simple	iii)Measuring periodic time with the help of	
	pendulum	stop watch	
	r	iv) Tabulating observations.	
12	To measure unknown	i) Drawing the circuit diagram for series	CCF101-4
	resistance by	connections of the resistances.	
	Wheatstone's meter	ii) Connecting the resistances for series	
		, , , , , , , , , , , , , , , , , , , ,	

bridge	method as per circuit diagram	
blidge.	include as per circuit diagram.	
	iii) Finding the correct position of null point &	
	measuring correct	
	balancing lenses on Meter bridge.	
	iv)Tabulating observations.	

C) INDUSTRIAL EXPOSURE

Sr.	Mode of Exposure	Торіс
No.	(Visit/Exp.Lect/Ind.Survey/)	
1.	Field applications in theory lectures in	All topics in course syllabus
	every topic	
2.	Practical exercise on overview of field	Part of term work
	applications of Physics	
	Demonstration of the state of t	the shall be such as the d best stands at a source of a

Report of each Industrial Exposure Activity shall be submitted by student as a part of term work for evaluation.

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION a) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per given criteria.

Domain Particulars		Marks out of 25
	Understanding	05
Cognitive	Observations, calculations & Result	05
-	table	
	Operating Skills	05
Psychomotor	Neat & complete circuit Diagram /	05
	schematic Diagram.	
Affactive	Discipline and punctuality	5
Allective	Decency and presentation	
	25	

ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted as per criteria given below

Criteria for Continuous Assessment of Practical work and Progressive skill Test :

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram.	05
2	Observations & Result Table	05
3	Sample Calculations with relevant Formulae.	05
4	Proper Graphs & Procedure / workmanship Safety measures	05
5	Oral Based on Term Work	05
	Total	25

(b) Criteria for assessment at semester end practical exam:

Every student has to perform one practical within 2 hours at semester end practical exam which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Preparedness for practical	10
2	Correct figures / diagrams	10
3	Observation tables	10
4	Result table / calculations / graphs	10
5	Safety / use of proper tools	10
	Total	50

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Discussions 2. Regular Home Assignments. 3. Laboratory work

Teaching and Learning resources:

1. Chalk board	2. Video clips	3.Slides	4. Item Bank	5. Charts
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REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	B.G. Bhandarkar	Applied Physics	Nirali publications
2.	Manikpure – Deshpande	Applied Physics	S. Chand publications
3	Narkhede, Pawar, Sutar	Applied Science	Nirali publications
4	Shelake, Shinde, Adwankar	Applied Science	Vision publications
5	B.L. Theraja	Engineering Physics	S. Chand Publishers – New Delhi
6	Beiser	Concept of modern physics	Tata Mc-Graw Hill
7	E. Zebro Wski	Physics for Technicians	Tata Mc-Graw Hill
8	V. Rajendran	Engineering Physics	Tata McGraw-Hill Publications

b) Websites

- i)
- http://www.physicsclassroom.com http://scienceworld.wolfram.com/physics/ ii)
- http://physics.about.com/ iii)

* * *

COURSE ID:

Course Name	: CHEMISTRY OF ENGINEERING MATERIALS
Course Code	: CCF103
Course Abbreviation	: FCHA

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s)	: <course and="" code="" name=""></course>
Teaching Scheme :	

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	06

Evaluation Scheme :

Component	Progressive Assessment		Semester end		Total
Component	Theory	Practical	Theory	Practical*	
Duration	Two tests (1 hour each)	One Skill Test (2 hours)	One paper (3 hours)	One practical (2 hours)	
Marks	20 each	25	80	50*	150

* Assessment as per pro-forma II.

RATIONALE :

Basic science such as Chemistry is the foundation of Engineering & Technology. It is most essential to learn the basic science to understand the fundamental concepts in Engineering & Technology. Engineering chemistry deals with the study of structure, composition and Properties of the materials, which form the core of the fundamental sciences. Many Processes are based on principles of Chemistry in various s industries. Topics such as water, Electrochemistry, Corrosion and protection of metals from corrosion, are some of the direct applications of chemistry in engineering. Hence the knowledge of chemistry is essential to the aspiring engineers of all branches in their field.

Engineering materials like Steels, Rubber, Plastic, Thermocole, Glass wool, Adhesive, Paints, Lubricants are the backbone of various industries, machines, equipment, & processes.

COMPETANCY :

Apply the knowledge of chemistry to use the engineering materials for various purposes depending on their chemical properties.

Cognitive: Understanding & applying properties of chemicals in engineering field. Psychomotor : Handling & use of glasswares & chemicals handling.

Affective :i)Attitude of ii) Accuracy iii) Safety iv) Punctuality

COPURSE OUTCOMES :

- 1. CCF-103-1 Understand the applications of basic concepts in chemistry.
- 2. CCF-103-2 Apply the knowledge of electrochemistry in industry for electroplating & electro refining.
- 3. CCF-103-3 Interpret the reasons of corrosion & remedies by using proper techniques.
- **4.** CCF-103-4 Use relevant water treatment process to solve industrial problems.
- 5. CCF-103-5 Applying proper material for specific purpose.
- 6. CCF-103-6 Apply knowledge of extraction, properties of iron in engineering applications.

7. CCF-103-7 Study properties of lubricants, polymers, insulators, adhesives, composite materials for different applications.

		Programme Outcomes POs and PSOs										
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance
Competency.	3	3	3	2	-	1	-	-	-	1	1	1
CCF-103-1	3	3	3	2	-	1	-	-	-	1	2	2
CCF-103-2	3	3	3	3	1	2	-	-	-	2	2	2
CCF-103-3	3	3	3	2	-	2	-	-	-	1	3	3
CCF-103-4	3	3	3	3	1	2	-	-	-	2	2	3
CCF-103-5	3	2	3	2	2	1	I	-	-	2	2	2
CCF-103-6	3	2	2	-	2	1	-	-	-	1	2	2
CCF-103-7	3	3	2	2	3	3	-	-	-	3		

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

CONTENT :

A. THEORY :

Section I			
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course outcomes CCF103-1 Understand the appli	ications of bas	sic concepts in
cł	nemistry.		
1	ATOMIC STRUCTURE		
	1.1 Atom : Fundamental particles, Nature of atom		
	1.2 Atomic Number, Mass Number, Isotopes and		
	isobars		
	1.3 Bohr's theory of atom		
	1.4 Statement of Hund's rule of maximum		
	multiplicity, Pauli's exclusion principle		
	Aufbau's principle		
	1.5 Rules of distribution of planetary electrons	07	08
	1.6 Electronic configuration of atoms with atomic	01	00
	number 1-30		
	1.7 Lewis and Langmuir's concept of stable electronic		
	configuration		
	1.8 Electovalency and Co-valency		
	1.9 Formation Of electrovalent compounds-		
	NaCl,MgO		
	1.10 Formation of Covalent compounds-H ₂ O,CO ₂		

	ndustry for electroplating & electrorefining.		
2	 ELECTROCHEMISTRY 2.1 Definitions- Conductor, Electrolyte, Electrode 2.2Difference between metallic conduction and electrolytic conduction 2.3 Distinguish between Atom & Ion 2.4 Arrhenius Theory Of Ionisation 2.5 Degree of Ionisation & Factors affecting degree of ionisation 2.6 Electrolysis of CuSO4 solution by using a) Pt -electrodes b) Cu-electrodes 2.7 Industrial applications of electrolysis 2.7.1 Electroplating 2.7.2 Electro refining of Metals. 2.8 Faraday's Laws of Electrolysis 	07	08
	2.9 Numerical problems based on Faraday's laws		
3.			
	 CORROSION AND PROTECTIVE COATING 3.1 Definition & types of corrosion 3.2 Dry or Atmospheric corrosion , Oxide Film Formation & its types ,Factors affecting atmospheric corrosion 3.3 Wet or electrochemical corrosion 3.4 Factors influencing immersed corrosion 3.5 Methods of protection of metal from corrosion - Hot dipping (Galvanizing & Tinning) ,Metal spraying, Metal cladding, Cementation or sherardizing 	07	08
(CORROSION AND PROTECTIVE COATING 3.1 Definition & types of corrosion 3.2 Dry or Atmospheric corrosion , Oxide Film Formation & its types ,Factors affecting atmospheric corrosion 3.3 Wet or electrochemical corrosion 3.4 Factors influencing immersed corrosion 3.5 Methods of protection of metal from corrosion - Hot dipping (Galvanizing & Tinning) ,Metal spraying, Metal cladding, Cementation or sherardizing 	07 process to sol	08 ve industrial

 disadvantages & removal of scale		
4.7 Sterilization of water - Chlorination -by Cl ₂ ,		
bleaching powder, chloraamine with chemical		
reactions		
4.8 Ion Exchange method to remove total hardness of water		
4.9 pH definition, pH scale , applications of pH in boiler, suga r industry & sewage		

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Section I1

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
C C	Course outcomes CCF-103-6 Apply knowledge of extraction, properties of iron in engineering applications.		
5	 METALLURGY & ALLOYS 5.1 Occurrence of metals , Definition of mineral , ore, flux, Gangue & Slag 5.2 Flow chart of metallurgical processes 5.3 Concentration of ores – Physical Methods - Gravity Separation Method, Electromagnetic separation method, Froth floatation method 5.4 Chemical Methods - Calcination & Roasting . 5.5 Ores of Iron. 5.6 Extraction of Iron from its ore - Blast Furnace – construction, Working ,Reactions, Products. 5.7 Properties & uses of cast iron , wrought Iron and Steel. 5.8 Definition , Classification & Purposes of making alloy 5.9 Composition, Properties, & Engineering applications of Nonferrous Alloys – Duralumin, Monal metal, Woods metal & Ferrous Alloys -Heat resisting steel , Magnetic steel , Stainless steel 	12	12
Course outcomes CCF-103-6 Study properties of lubricants, polymers, insulators, adhesives, composite materials for different applications.			
6	LUBRICANTS 6.1 Definition , Classification & Functions of lubricant. 6.2 Lubrication & it's types - Boundary lubrication,	05	06

	Fluid film lubrication ,Extreme pressure lubrication				
	6.3 Characteristics of lubricants				
	Viscosity Viscosity index Oilinoss Valatility cloud				
	& pour point, Flash & fire point, Acid Value,				
	6.4 Selection of lubricant for Gears, Cutting tools, ,				
	Concrete Mixture machine, sewing machine.				
0	CCF-103-7 Apply proper material for specific purpose.				
7					
1	PAINT AND VARNISH				
	7.1 Oil Paint Definition & characteristics of oil paint				
	7.2 Purpose of using oil paint				
	7.3 Ingradiants of all paint with suitable example δ_{τ} its	05	06		
	functions During all (ushiels) Drive Dismont	03	00		
	functions - Drying oil (venicle), Drier, Pigment,				
	Thinner, Filler (extender), Plasticizer				
	7.4 Varnish – Definition, Types, Constituent,				
	Properties & applications.				
	7.5 Distinction between paint & varnish				
	7.6 Water based and solvent base paints.				
	1				
a	adhesives, composite materials for different applications.				
8	CHEMISTRY OF NON-METALIC ENGINNERING MATERIALS				
	8.1 INSULATORS				
	8.1.1 Definition & Characteristics of good insulator				
	812 Propagation Propagation of Class wool				
	112 Thermonolo				
	& Thermocole				
	8.2 ADHESIVES				
	821 Definition of Adhesives				
	8.2.2 Characteristics of good A discisson				
	8.2.2 Characteristics of good Adhesives				
	8.2.3 Properties & uses of Adhesives.				
	8.3 COMPOSITE MATERIALS				
	8.3.1 Definition, Classification, Properties Applications				
	of Composite materials	10	16		
	· · · · · · · · · · · · · · · · · · ·	10	10		
	8.4 PLASTICS				
	8.4.1 Polymer, Polymerization, methods of				
	polymerization-Addition & condensation				
	842 Classification of plastice Thormo softening				
	plastic laboration of plastics - merino-softening				
	plastic & merniosetting plastics.				
	8.4.5 Engineering properties & applications of plastic				

	8.5	RUBBER		
	8.5.1	Elastomer, Natural Rubber & Synthetic rubber		
	8.5.2	Drawbacks of Natural Rubber		
	8.5.3	Vulcanization of Rubber		
	8.5.4	Characteristics & related applications of rubber -		
		Tack, Rebound, Elasticity & Abrasion resistance		
		-		
Semest	ter end e	exam question paper should be such that total marks of question	s on each topic	is one and half

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination :

Section /]	Distribution of marks	3	Course	Total
Topic no	Name of topic	Remember	Understand	Application	out come	marks
I/1	Atomic structure	06	02	-	CCF103-1	08
I / 2	Electrochemistry	02	02	04	CCF103-3	08
I / 3	Corrosion &protective coating	04	02	02	CCF103-5	08
I / 4	Water	08	04	04	CCF103-6	16
II/5	Metallurgy & Alloys	06	06	06	CCF-103- 3&CCF- 103-4	18
II/6	Lubricants	04	02	02	CCF-103-4	06
II/7	Paint & Varnish	02	02	02	CCF-103-1	06
II/8	Chemistry of nonmetallic engg. materials	04	02	04	CCF-103-4	10
	Total					80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B. TERM WORK Term work shall consist of the following :

i) Laboratory experiments and related skills to be developed :

Sr. No.	Title of Experiment	Skills to be developed	Course Outcomes
1	Introduction to Chemistry laboratory	Awareness of chemicals ,glasswares &instruments used in chemistry laboratory	CCF-103-1
2	Preparation of 1 N, 0.5 N & 0.1 N NaOH, HCI, Oxalic acid, FeSO ₄ , etc.	Skill of weighing , handling Glassware & measuring solutions	CCF-103-1
3	Titration of strong acid and strong base. (HCl X NaOH)	Skills of determining accurate end point of titration & development of measurement skills.	CCF-103-1

4	Titration of strong acid, strong base& weak acid (HCI X NaOH X H ₂ C ₂ O ₄ .H ₂ O	Skills of determining accurate end point of titration & development of measurement skills.	CCF-103-1
5	Titration of weak base, strong acid & strong base (Na ₂ CO ₃ X H ₂ SO ₄ X KOH	Skills of determining accurate end point of titration & development of measurement skills.	CCF-103-1
6	Estimation of chloride content in water by Mohr' s method	Measurement skill utilization of practical data for testing & estimation	CCF-103-3
7	Determination of hardness of water by E.D.T.A method	Measurement skill utilization of practical data for testing & estimation	CCF-103-4
8	Determination of viscosity of oil by Ostwald's viscometer	Measurement skill utilization of practical data for testing & estimation	CCF-103-6
9	Estimation of Ca in limestone.	Measurement skill utilization of practical data for testing & estimation	CCF-103-1
10	Estimation of % of Fe in given sample of steel	Measurement skill utilization of practical data for testing & estimation	CCF-103-1

a) Assessment criteria for Practical Work :

i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cognitive	Application	05
Describer and the	Operating Skills	05
Psychomotor	Drawing / drafting skills	05
Affastiva	Discipline and punctuality	05
Allective	Decency and presentation	-
	25	

Criteria for Continuous Assessment of Practical work

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitive	Understanding	05
cognitive	Application	05
Psychomotor	Operating Skills	10
rsycholilotor	Writing skills	10
Affective	Discipline and punctuality	10
7 meetive	Timeliness and accuracy	10
	50	

Progressive Skill Test:

One mid-term Progressive Skill Test of 25 marks as per following criteria.

Domain	Particulars	Marks out of 50
Cognitive	Understanding	05
cognitive	Application	05
Psychomotor	Operating Skills	05
rsyenomotor	Writing skills	05
Affective	Discipline and punctuality Timeliness and accuracy	05
	25	

Final marks of term work shall be awarded as per Assessment Pro-forma II.

C) INDUSTRIAL EXPOSURE :

(Included in Laboratory Manual for Applied Mechanics)

SN	Mode of Exposure	Торіс
1.	Lecture demos by industry experts	Chapter of theory syllabus
2.	Market survey of apparatus and chemicals	Term work assignment
<i>2</i> .		Term work assignment

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices
- 3. Home Assignments

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

REFERENCE MATERIAL :a) Books / IS Codes

Sr. No.	Author	Title	Publisher
1.	Jain & Jain	Engineering chemistry	Dhanpatrai publishing
			co.
2.	S. C.	Engineering materials	Engineering publication
	Rangawala		
3.	Jain & Agarwal	Metallurgical Analysis	Agarwal publications
4.	O. P. Khanna	Material science & technology	Khanna publication on
			2006
5.	Rollason	Metallurgy for Engineers	ASM publication
6.	J. C. Kuriacose	Chemistry in Engineering & Vol.	

		1 & 11	
7.	P. C. Jain	Chemistry of Engineering	
		Materials	
8	S. S. Dara	A text of Engineering Chemistry	

b) Websites

- iv)
- v)
- vi)
- vii)
- www.substech.com www.kentchemistry.com www.chemcollective.org www.wqa.org www.chemistryteaching.com viii)

COURSE ID:

Course Name	: BASIC MATHEMATICS
Course Code	: CCF105
Course Abbreviation	: FBMT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <*nil* >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	04

Evaluation Scheme :

	Progressive Asses	Terr	Total		
Component	Theory	Tutorials	Theory	Practical	Totai
Details and Duration	Average of two tests of 20 marks each	As mentioned in the syllabus	Term End Theory Exam (03 hours)	NIL	
Marks	20		80		100

RATIONALE:

Mathematics is an important prerequisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of mathematics is an effective tool to pursue and master the applications in the engineering and technological fields. Algebra provides the language and abstract symbols of mathematics. The topics Matrices and Determinants are helpful for finding optimum solution of system of simultaneous equations which are formed in the various branches of engineering using different parameters .Trigonometry is the study of triangles and angles. Contents of this subject will form foundation for further study in mathematics.

Competency:

Apply principles of Basic Mathematics to solve mathematical problems

1.Cognitive:Apply mathematical concepts

2. Psychomotor: Use of scientific calculator

3. Affective : Attitude of accuracy, punctuality, proper reasoning and presentation

Course Outcomes(CO's) :

CCF105-1 :Solve simultaneous equations using Cramer's rule.

CCF105-2 :Resolve a given function into partial fractions.

CCF105-3: Solve simultaneous equations by using inverse of matrix method.

CCF105-4 :Expand any binomial expression for positive integral index.

CCF105-5 :Memorize and solve problems using trigonometric formulae.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long leaning	PSO1 Work in mfg& service sector	PSO 2 Start entrepre neurial ativity
Competency:	3	-	1	-	-	-	-	-	-	3	-	-
CCF105-1 :	3	-	1	-	-	-	-	-	-	3	-	-
CCF105-2	3	-	1	-	-	-	-	-	-	3	-	-
CCF105-3	3	-	1	-	-	-	-	-	-	3	-	-
CCF105-4	3	-	1	-	-	-	-	-	-	3	-	-
CCF105-5	3	-	1	-	-	-	-	-	-	3	-	-

CONTENT : A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
Course Outcon	ne CCF105-1 : Solve simultaneous equations using Cramer's rule	2.			
1	Determinants				
	1.1 Definition of nth order determinant				
	1.2 Expansion of second and third order				
	determinants	04	06		
	1.3To solve simultaneous equations having 3 unknowns using Crammer's Rule				
	1.4 Consistency of equations using Determinants				
Course Outcor	<i>ne CCF105-2 :Resolve a given function into partial fractions.</i>				
2	Partial Fractions				
_	2.1Definition of rational, proper and improper fractions	06	12		
	2.2 Various cases of Partial fractions and Examples				
Course Outcome CCF105-3 : Solve simultaneous equations by using inverse of matrix method					
3	Matrices				
-	3.1 Definition of a matrix, Types of matrices				
	3.2 Algebra of matrices				
	3.3 Equality of two matrices, Transpose of a matrix	10	16		
	3.4 Minor and Co-factor of an element of a matrix	10	10		
	3.5 Adjoint and Inverse of a matrix				
	3.6 Solution of simultaneous equations by Inverse of a matrix				
	method				

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
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Course Outcome CCF105-1 : Solve simultaneous equations using Cramer's rule.

Course Outcome CCF105-4 : *Expand any binomial expression for positive integral index.*

4	Binomial Theorem		
	4.1 Statement of theorem for positive integral power	0.4	0.6
	4.2 Expansion	04	VO
	4.3Simple Examples on expansion		
	Total	24	40
1.Semester end e	exam question paper should be such that total marks of questions on	each topic is	one and half
times the marks a	allotted above but the candidates are able to attempt questions of the ab	ove allotted	marks only.
2.In each topic, c	orresponding applications will be explained		
•			

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)				
Course Out	Course Outcome CCF105-5 : Memorize and solve problems using trigonometric formulae.						
6	Trigonometric ratios of Compound and Allied Angles	06	08				
	6.1 Proofs of sine ,cosine and tan of (A+B) and (A-B) 6.2 Examples						
7	Trigonometric ratios of Multiple Angles7.1 Proofs of sine, cosine and tangent of 2θ, 3θ7.2 Examples	05	10				
8	Factorization and Defactorization Formulae 8.1 Proofs of above formulae 8.2 Examples	04	08				
9	Inverse Trigonometric Ratios9.1 Definition9.2 Principle value9.3 Proof of standard formulae9.4 Examples	07	10				
	Total	24	40				
 Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only. In each topic corresponding applications will be explained 							

Topic	Name of tonia	Distrib	Total		
No.	Name of topic	Knowledge	Comprehension	Application	Marks
1	Determinants	-	2	4	06
2	Partial Fractions	2	2	8	12
3	Matrices	2	2	12	16
4	Binomial Theorem	2	-	4	06
5	Trigonometric Ratios and Identities	2	-	2	04
6	Allied Angles	2	2	4	08
7	Compound Angles	2	-	8	10
8	Factorisation & De- factorisation angles	2	-	6	08
9	Inverse Trigonometric ratios	2	2	6	10
TOTAL		16	10	54	80

Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Sr.No	Topics	Tutorial Content (10 problems in each tutorial)
1	Determinants	Examples on expansion of determinants, Cramer's rule, consistency of equations.
2	Partial Fractions	To resolve given function into partial fractions-Different cases
3	Matrices	Examples on addition ,Subtraction and Multiplication of Matrix
4	Matrices	To find adjoint ,Inverse of a given matrix,To solve simultaneous equation by Matrix method
5	Binomial Theorem	To expand $(x+y)^n$ by Binomial theorem,
6	Trigonometric Ratios and Identities	Examples on conversion of degree to radian and vice versa, simple examples on trigonometry.
7	Allied Angles	Examples on Allied angles
8	Compound Angles	Examples on Compound angles
9	Factorisation & De-factorisation angles	Examples on Examples on Allied angles
10	Inverse Trigonometric Ratios	Examples on principle value and trigonometrics functions

B) TUTORIALS

INSTRUCTIONA STRATEGIES :

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Tutorials

Teaching and Learning resources:

- 1. Chalk board
- 2. Item Bank

REFERENCEMATERIAL:

a) Books:

Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	A Text Book on Engineering Mathematics (First Year Diploma	Phadake Prakashan, Kolhapur
2.	Patel,Rawal and others	Basic Mathematics	Nirali Prakashan,Pune
3.	P.M.Patil and Others	Basic Mathematics	Vision Prakashan, Pune
4.	Engineering Mathematics	S. S. Sastry	Prentice Hall of India
5.	S.P.Deshpande	Mathematics for polytechnic	Pune Vidyarthi Griha,Pune

b) Website

- i) www.khanacademy.org
- ii) www.easycalculation.com
- iii) www.math-magic.com

* * *

COURSE ID:

Course Name	: ENGINEERING MATHEMATICS
Course Code	: CCF106
Course Abbreviation	: FEMT

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : CCF105 Basic Mathematics

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	04

Evaluation Scheme :

	Progressive Assessment		Term End		
Component	Theory	Assignme nts	Theory	Practical	Total
Details and Duration	Average of two tests of 20 marks each	As mentioned in the syllabus	Term End Theory Exam (03 hours)		
Marks	20		80		100

RATIONALE:

This subject is an extension of Basic mathematics of first semester and a bridge to further study of applied mathematics. The knowledge of mathematics is useful in other technical areas. Differential calculus has applications in different engineering branches. For example concepts such as bending moment, curvature, maxima and minima. Numerical methods are used in programming as an essential part of computer engineering. In Metrology and quality control statistical methods are used to determine the quality and suitability of components. Engineering mathematics lays the foundation to understand technical principles in various fields.

Competency: Apply principles of Engineering Mathematics to solve Engineering problems.

1.Cognitive: Apply principles of Engineering Mathematics to Engineering problems

- 2. Psychomotor: a) Use of co-ordinate geometry in animation, autocad, computer graphics etc.b) Proper handling of calculator.
- 3. Affective : Attitude of accuracy, punctuality, presentation, visualization.

Course Outcomes:

CCF106-1 : Solve problems on two dimensional co-ordinate geometry for straight line and circles.

CCF106-2 : Find approximate solution of algebraic equations and simultaneous equations by various methods.

CCF106-3 : Find limits of different types of functions using various methods.

CCF106-4 : Solve the problems of maxima, minima and geometrical applications.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

				P	rogramm	e Outcor	nes POs a	and PSO	s			
Competency and COs	PO 1 Basic know ledge	PO 2 Disci pline know ledge	PO 3 Expe rime nts and pract ice	PO 4 Engi neeri ng Tools	PO 5 The engin eer and societ y	PO 6 Envi ronm ent and susta inabi lity	PO 7 Ethic s	PO 8 Indiv idual and team work :	PO 9 Com muni catio n	PO 10 Life- long leani ng	PSO1 Work in mfg& service sector	PSO 2 Start entrepr eneuria l ativity
Competency:	3	-	1	-	-	-	-	-	-	3	-	-
CCF106-1 :	3	-	1	-	-	-	-	-	-	3	-	-
CCF106-2 :	3	-	1	-	-	-	-	-	-	3	-	-
CCF106-3 :	3	-	1	-	-	-	-	-	-	3	-	-
CCF106-4	3	-	1	-	-	-	-	-	-	3	-	-

CONTENT:

C. THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course outcome CCF106-1 : Solve problems on two dimension straight line and circles.	nal co-ordina	ate geometry for
1	 Point and Distances 1.1 Distance formula (Only mention,No examples) 1.2 Section formula & midpoint formula (No Examples & without proof) 1.3 Centroid of a triangle & Area of Triangle 1.4 Collinearity 	02	04
2	 The Straight line 2.1 Slope, intercepts & various methods of finding slope 2.2 Conditions for two straight lines to be parallel and Perpendicular to each others 2.3 Various forms of equations of straight line 2.4 Perpendicular distance of a point from a line 2.5 Distance between two parallel lines 2.6 Angle between two straight lines 2.7 Intersection of two straight lines & the equation of line passing through this point of intersection 	06	08
3	Circle 3.1 Equations of Circle (various forms) 3.2 Examples to find equation of circles	04	08
	Course outcome CCF106-2 : To find approximate solution simultaneous equations by various methods.	of algebrai	c equations and

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course outcome CCF106-1 : Solve problems on two dimension straight line and circles.	nal co-ordin	ate geometry for
4	Numerical solution of Algebraic Equations 4.1 Bisection Method 4.2 Regula- Falsi Method	06	10
5	Numerical solution to simultaneous equations 5.1 Jacobi's Method 5.2 Gauss-Seidel method	06	10
	Total	24	40

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	methods.	of junction	s using various
6	 Functions 6.1 Definition and Concept of function 6.2 Definition of Odd & Even functions, Explicit & implicit functions, Composite functions, Parametric functions 6.3 Value of a function 6.4 Examples on value of functions, Odd & Even functions , Composite functions 	03	06
7	Limits 7.1 Definition 7.2 Limits of algebraic functions by factorization, simplification, rationalization , Limit as $x \rightarrow \infty$ 7.3 Limits of trigonometric functions by factorization, formula $\frac{\sin x}{x}$ as $x \rightarrow 0$, substitution .	06	08
	<i>Course outcome CCF106-4 : Solve the problems of maxim applications.</i>	a, minima d	and geometrical

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course outcome CCF106-3: Find limits of different types methods.	of function	s using various
8	Differentiation		
	8.1 Definition, Derivative of standard functions (without poof),		
	8.2 Derivative of sum, difference, product and quotient of two or more functions		
	8.3 Derivative of composite functions	12	20
	8.4 Derivative of Inverse functions	12	20
	8.5 Derivative of Implicit functions		
	8.6 Derivative of Parametric functions		
	8.7 Derivative of exponential and logarithmic functions		
	8.8 Logarithmic differentiation		
	8.9 Differentiation of second order		
9	Applications Of Derivatives	03	06
	9.1 Geometrical meaning of derivative (To find equation of		
	Tangent and normal)		
	9.2 Maxima and minima of functions		
	Total	24	40
1.Sem	nester end exam question paper should be such that total marks of	of questions	on each topic is
000 00	nd half times the marks allotted above but the condidates are abl	a to attempt	questions of the

1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

2. In each topic corresponding applications will be explained

Specification table for setting question paper for semester end theory examination:

Topic	Nama of tonia	Distribution of	Distribution of marks (level wise)				
No.	Name of topic	Knowledge	Comprehension	Application	Marks		
1	Point and Distances	2		2	4		
2	Straight line	2	2	4	8		
3	Circle	2	2	4	8		
4	Numerical solution of Algebraic Equations and	2	2	16	20		
5	simultaneous Equations						
6	Functions	2	-	4	6		
7	Limits	2	2	4	8		
8 9	Differentiation	4	4	12	20		
10	Applications Of Derivatives			6	6		
Total		16	12	52	80		

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Sr No.	Topic	Tutorial Content (10 problems in each tutorial)				
1	Point and Distances	Examples on Centriod of triangle, area of triangle, colliarity				
2	Straight line	Examples on different cases of straight line, To find perpendicular distance of a point from a line, angle between two lines, intersection of lines.				
3	Circle	To find equation of Circle- Different forms				
4	Num. solution of	Numerical solution of algebraic equations.				
5	Algebraic & & simultaneous Eq	Numerical solution of simultaneous equations				
6	Functions	Examples on functions				
7	Limits	Evaluation of limits by Factorisation, Rationalization, Simplification, Infinity method Evaluation of limits of Trigonometric functions				
8	. Differentiation	To find derivatives by product rule, quotient rule, Chain rule, Inverse function, Implicit function				
9	. Differentiation	To find derivatives of Parametric function, Logarithmic function,				
		Derivatives of second order				
10	Applications of	To find equation of Tangent, Normal & To find Maxima and Minima of a				
	Derivatives.	function.				

D. TUTORIALS : Note - Tutorials are to be used to get enough practice

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Tutorials
- Teaching and Learning resources:
- 1. Chalk board
- 2. Item Bank

REFERENCE MATERIAL:

a) Books:

Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	Engineering Mathematics III	Phadake Prakashan,
			Kolhapur
2.	Patel, Rawal,	Engineering Mathematics	Nirali Prakashan, Pune
3.	Mathematics for	S. P. Deshpande	Pune Vidyarthi Griha
	Polytechnic		Prakashan
4.	Sameer Shah	Engineering Mathematics	Tech-Max
			Publication, Pune
5.	A.M. Vaidya	Applied Mathematics	Central Techno

b) Websites

i) <u>www.khanacademy.org</u>

ii)

www.easycalculation.comiii)www.math-magic.com

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COURSE ID:

Course Name	: ENGINEERING DRAWING -1	(CE/ME/MT)
Course Code	: CCF107	
Course Abbreviation	: FEDA	

TEACHING AND EVALUATION SCHEME:Pre-requisite Course(s): Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	00

Evaluation Scheme:

Mode of	Progressive Assessment		Term End Examination			
Evaluatio n	Theory	Practical	Theory Examination	Term Work	Oral Examinatio n (External)	Tota l
Details of Evaluatio n	Average of two tests of 20 marks each	 i. 25 marks for each practical ii. One PST of 25 marks 	Term End Theory Exam (03 hours)	As per Proforma- III	-	
Marks	20		80	25	-	125

RATIONALE:

Engineering drawing is the language of engineers. The concept of engineering drawing is used to develop, express the ideas, and convey the instructions which are used to carry out jobs in the field of Engineering. The course illustrates the techniques of drawing in actual practice. This Preliminary course aims at building a foundation for the further course in drawing and other allied subjects. This subject is useful in developing, drafting and sketching skills of students.

COMPETENCY:

Use various drawing Instruments for drafting and sketching solid geometry

Cognitive: Understand various drawing procedures..

Psychomotor: Draw engineering curves & projections of lines, planes & solids

Affective: Attitude of using i) Procedures ii) Practices iii) Drawing Instruments iv) Accuracy v) Drafting Skill

COURSE OUTCOMES:

CCF107-1 Understand various fundamentals in engineering drawing.
CCF107-2 Produce different types of engineering curves.
CCF107-3 Produce the projection of point & lines inclined to one reference plane..
CCF107-4 Produce the projection of different planes & solids.
CCF107-5 Produce sectional views of different types of solids.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

				P	rogram	me Outcor	mes POs	and PSOs				
Competency and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Engineeri ng Tools	PO 5 The enginee r and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learnin g	PSO1 Work in mfg & service sector	PSO 2 Start entrepre neurial activity
Competency :	3	3	3	3	2	-	-	2	2	3	3	3
CCF107-1	3	3	2	3	-	-	-	1	1	3	3	1
CCF107-2	2	2	3	3	1	-	-	1	1	2	2	1
CCF107-3	2	2	3	3	1	-	-	1	1	3	1	1
CCF107-4	2	3	3	3	1	-	-	2	2	3	2	2
CCF107-5	3	3	3	3	1	-	-	2	2	2	3	2

CONTENT: A. THEORY:

SECTION	-	I

Sr. No.	Topics	Teachin g (Hours)	Theory Evaluatio n Marks
	Course Outcome CCF107-1 Understand various fundamentals in eng	gineering dra	awing
1.	 Introduction To Engineering Drawing 1.1 Drawing Instruments and their uses 1.2 Standard sizes of drawing sheets (ISO-A series) 1.3 Letters and numbers (single stroke vertical) Convention of lines and their applications. 1.4 Scale (reduced, enlarged & full size) Plain scale and Diagonal scale. 1.5 Dimensioning technique as per SP-46 (Latest Edition) Types and applications of chain, parallel and Co-ordinate dimensioning 	04	08
	Course Outcome CCF107-2 Produce different types of enginee	ering curves	
2.	 Engineering Curves 2.1 Conic curves and their applications 2.2 Ellipse by Arc's of circle method & Concentric circles method. 2.3 Parabola by Directrix and focus method & Rectangle method 2.4 Hyperbola by Transverse Axis focus Method & Rectangular hyperbola (Inclined axes). 2.5 Involutes of circle, triangle, square & pentagon, 2.6 cycloid, epicycloids, hypocycloid 2.7 Helix & Archimedean spiral. 	07	20
Cou	rse Outcome CCF107-3 Produce the projection of point & lines incline	d to one refe	rence plane

3.	Projection Of Point And Lines		
	3.1 Projection of points when point is in first quadrant Only		
	3.2 Projection of Line inclined to one Reference plane	03	12
	and Parallel to other Reference Plane		
	(Both ends of line should be in first quadrant)		

SECTION – II

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
Cours	se Outcome CCF107-4 Produce the projection of different planes & solid	ds.	
4.	Projection Of Planes 4.1 Projection of Planes - Circular, Square, Triangular, Rectangular, Pentagonal, Hexagonal Shapes Inclined To One Reference Plane And perpendicular to other Reference Plane. (Planes in First Quadrant Only)	05	08
Cour	se Outcome CCF107-4 Produce the projection of different planes & solid	ds.	
5.	 Projection Of Solids 5.1 Projection of Solids Like Cube, Prisms, Pyramids, Cone, Cylinders and Tetrahedron. (Axis of Solids inclined to one reference plane and Parallel to other Reference Plane) 	05	16
Cours	se Outcome CCF107-5 Produce sectional views of different types of soli	ds.	
6.	Sections of Solids 6.1 Sections of Solids Like Cube, Prisms, Pyramids, Cone and Cylinders. (Axis of Solids being vertical and Section plane inclined to one reference plane and perpendicular to other Reference Plane)	06	16
	Course Outcome CCF107-1 Onderstand various fundamentals in eng	ineering urt	iwing
1.	 AUTOCAD 7.1 Introduction to CAD software (Basic commands like Draw, modify). Advantages of CAD, 7.2 Geometrical Constructions 7.3 Draw a basic 2-D geometrical entities using CAD 	02	NIL
	Total	32	80
1.Sen and h	nester end exam question paper should be such that total marks of quest alf times the marks allotted above but the candidates are able to attemp	ions on each ot questions	topic is one of the above

allotted marks only. 2.No theory question on chapter no.7

Specification table for setting question paper for semester end theory examination:

Тор	Nome of torio	Distribution of marks (Cognitive level-wise)			Course	Total	
No.	Name of topic	Rememb er	Understan d	Applica- -tion	Outcome	Mark s	
1	Introduction To Engineering Drawing	04	02	02	CCF107-1	08	
2	Engineering curves	04	04	12	CCF107-2	20	

3	Projection of Point And Lines	04	04	04	CCF107-3	12
4	Projection of Planes	02	04	02	CCF107-4	08
5	Projection of Solids	04	04	08	CCF107-4	16
6	Sections of Solids	02	12	02	CCF107-5	16
	Total	20	30	30		80

B. TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr. no	Laboratory experience	Skills developed	Course Outcome
1	Geometrical Constructions Using CAD (1 Sheet)	To develop drawing skill	CCF107- 1
2	Engineering curves (1 Sheet)	To develop drawing ability in conics	CCF107- 2
3	Projections of line (1 Sheet)	To develop drawing ability in Projections of line	CCF107- 3
4	Projections of Planes (1 Sheet)	To develop drawing ability in Projections of Planes	CCF107- 4
5	Projections of Solids (1 Sheet)	To develop drawing ability in Projections of Solids	CCF107- 4
6	Sections of Solids (1 Sheet)	To develop drawing ability in Sections of Solids	CCF107- 5

Criteria for Continuous Assessment of Practical work and Progressive Skill Test: a)Continuous Assessment of Drawing Practical

Every practical Sheet shall be assessed for **25** marks as per criteria given below:

Sr	Criteria	Marks allotted
No.		
1	Attendance	05
2	Preparedness	05
3	Correctness and understanding	10
4	Line work and neatness	05
	Total	25

b)Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25marks shall be conducted as per criteria given below:

Sr	Criteria	Marks allotted
No.		
1	Correctness and understanding	10
2	Line work and neatness	05
3	Dimensioning and judgment without measurement	05

4	Proper use of instrument	05
	Total	25

INSTRUCTIONAL STRATEGIES : Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Computer, printer etc.
- 5. Question Bank

REFERENCE MATERIAL :

a) Reference Books:

Sr. No.	Author	Title	Publisher
1.	N. D. Bhatt	Engineering Drawing	Charotar Publishing House
			2010
2.	Amar Pathak	Engineering Drawing	Dreamtech Press, 2010
3.	D.Jolhe	Engineering Drawing	Tata McGraw Hill Edu., 2010
4.	M.B.Shah,	Engineering Drawing	Pearson, 2010
	B.C.Rana		
5.	K. Venugopal	Engineering Drawing and	New Age Publication, Reprint
		Graphics + AutoCAD	2006
6.	IS Code, SP – 46	Engineering Drawing Practice	

b)Web References:

1)http://www.design-technology.info/IndProd/drawings/

2)http://graphicalcommunication.skola.edu.mt/syllabus/engineering-drawing/

3)http://en.wikipedia.org/wiki/Engineering_drawing

4)http://www.engineeringdrawing.org/

5)<u>http://www.teachengineering.org/view_activity</u>

6)www.howtoread.co.in/2013/06/how-to-read-ed.html

7) http://www.slideshare.net/akhilrocker143/edp

8) http://www.24framesdigital.com/pstulpule

* * *
COURSE ID:

Course Name	: ENGINEERING DRAWING - II	(CE/ME/SM/MT)
Course Code	: CCF108	
Course Abbreviation	: FEDB	

TEACHING AND EVALUATION SCHEME: Pre-requisite Course(s) : CCF107 Engineering Drawing - I Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	00

Evaluation Scheme:

Modo of	Progressiv	e Assessment	Term	End Examin	ation	
Niode of Evaluatio n	Theory	Practical	Theory Examination	Term Work	Oral Examinatio n (External)	Tota l
Details of Evaluatio n	Average of two tests of 20 marks each	i. 25 marks for each practical ii. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	-	
Marks	20		80	25	-	125

RATIONALE:

Engineering drawing is the graphical language of engineers. It describes the scientific facts, Concepts, principles and techniques of drawing in any engineering field to express the ideas, conveying the instructions, which are used to carry out jobs in engineering field. This course aim for building a foundation for the further course in drawing and other allied subjects

COMPETENCY:

Read, draw & interpret the engineering drawing of simple objects.

Cognitive Understand &visualize the given component drawing.

Psychomotor Produce engineering drawing from the given problem

Affective Attitude of using i) Procedures ii) Practices iii) Drawing instruments iv) Techniques v)Drafting skill

COURSE OUTCOMES:

CCF108-1 Produce orthographic drawing from given pictorial view.

CCF108-2 Produce sectional orthographic drawing from given pictorial view.

CCF108-3 Draw proportionate free hand sketches.

CCF108-4 Interpret the views & complete the missing view.

CCF108-5 Visualize & draw accordingly the pictorial view by correlating the given views.

CCF108-6 Construct development of lateral surfaces.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

	1	Programme Outcomes POs and PSOs										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO 2
Competen cy and Cos	Basic knowled ge	Discipline knowledg e	Experi ments and practice	Engineer ing Tools	The engineer and society	Environ ment and sustainab ility	Ethics	Individu al and team work	Commun ication	Life- long learning	Work in mfg& service sector	Start entrepre neurial activity
Competen cy:	3	3	3	3	2	-	-	2	2	3	3	3
CCF108-1	1	2	3	3	-	-	-	1	1	3	3	2
CCF108-2	1	2	3	3	-	-	-	1	1	3	3	2
CCF108-3	1	2	3	3	-	-	•	1	1	3	2	1
CCF108-4	1	2	3	1	-	-	1	1	-	3	2	2
CCF108-5	2	2	3	2	-	-	-	-	-	3	3	2
CCF108-6	2	2	3	3	-	-	-	1	1	3	3	3

CONTENT: A. THEORY:

SECTION - I

Sr. No.	Topics	Teachin g (Hours)	Theory Evaluat ion Marks
Cour	se OutcomeCCF108-1 Produce orthographic drawing from given pictor	rial view.	
1.	Orthographic Projection 1.1 Introduction of Orthographic Projection-First and Third angle Projection Method 1.2 Conversion of Pictorial view into Orthographic Views. (First angle Projection Method Only) 1.3 Dimensioning Technique as per SP-46	06	16
Cour	se OutcomeCCF108-2 Produce sectional orthographic drawing from gi	ven pictoria	l view.
2.	Sectional Views. 2.1 Types of sections 2.2 Conversion of pictorial view into sectional Orthographic views. (First Angle Projection Method only)	06	16
Cour	se OutcomeCCF108-3 Draw proportionate free hand sketches.		
3.	 Free Hand Sketches 3.1Profiles of Screw Threads(V and Square Thread) Conventional representation of threads. 3.2 Free hand sketches of nuts and bolts, Washer, Locking arrangement of nuts, Foundation bolts 3.3Riveted and Welded Joints. 	04	08

SECTION – II

Course Outcome CCF108-4 Interpret the views & complete the missing view.4.Missing Views. 4.1 Interpretation of the given two orthographic views and draw missing view from the given two Orthographic views and Convert one of the given view into sectional Orthographic views and Convert (First Angle Projection Method only)0408Course Outcome CCF108-5 Visualize & draw accordingly the pictorial view by correlating the given views.5.Isometric Projection 5.1 Introduction 5.2 Isometric Axis 5.3 Isometric scale 5.4 Isometric view and Isometric Projection 5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)0616Course Outcome CCF108-6 Construct development of lateral surfaces.6.Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, Official view of a lateral surfaces of right solids Cube, Prism,0616	Sr. No.	Topics	Teaching (Hours)	Theory evaluatio n Marks		
4.Missing Views. 4.1 Interpretation of the given two orthographic views and draw missing view from the given two Orthographic views and Convert one of the given view into sectional Orthographic views and Convert (First Angle Projection Method only)0408Course Outcome CCF108-5 Visualize & draw accordingly the pictorial view by corretating the giver views.5.Isometric Projection 5.1 Introduction 5.2 Isometric Axis 5.3 Isometric scale 5.4 Isometric view and Isometric Projection 5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)0616Course Outcome CCF108-6 Construct development of lateral surfaces.6.Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 6.1 Methods of Development0616	Cours	Course OutcomeCCF108-4 Interpret the views & complete the missing view.				
Course OutcomeCCF108-5 Visualize & draw accordingly the pictorial view by correlating the given views.5.Isometric Projection 5.1 Introduction 5.2 Isometric Axis 5.3 Isometric scale 5.4 Isometric view and Isometric Projection 5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)0616Course OutcomeCCF108-6 Construct development of lateral surfaces.6.Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, Official official cube, Prism,0616	4.	Missing Views. 4.1 Interpretation of the given two orthographic views and draw missing view from the given two Orthographic views and Convert one of the given view into sectional Orthographic views (First Angle Projection Method only)	04	08		
given views.5.Isometric Projection 5.1 Introduction 5.2 Isometric Axis 5.3 Isometric scale 5.4 Isometric view and Isometric Projection 5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)0616Course Outcome CCF108-6 Construct development of lateral surfaces.6.Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 6.2 Development of Lateral surfaces of right solids Cube, Prism,0616	Cours	se OutcomeCCF108-5 Visualize & draw accordingly the pictorial vi	ew by corre	lating the		
 5. Isometric Projection 5.1 Introduction 5.2 Isometric Axis 5.3 Isometric scale 5.4 Isometric view and Isometric Projection 5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces) Course Outcome CCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16 	given	views.				
5.1 Introduction 5.2 Isometric Axis 5.2 Isometric Axis 6.1 Isometric scale 5.3 Isometric view and Isometric Projection 06 5.4 Isometric view and Isometric Projection 16 5.5 Conversion of Orthographic Views into Isometric 06 View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces) 16 Course OutcomeCCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16	5.	Isometric Projection				
5.2 Isometric Axis 5.2 Isometric Axis 5.3 Isometric scale 06 5.4 Isometric view and Isometric Projection 16 5.5 Conversion of Orthographic Views into Isometric 16 View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces) 16 Course OutcomeCCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces 16 6.1 Methods of Development 6.1 Methods of Development 16 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16		5.1 Introduction				
5.3 Isometric scale06165.4 Isometric view and Isometric Projection5.5 Conversion of Orthographic Views into Isometric165.5 Conversion of Orthographic Views into Isometric16View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)16Course Outcome CCF108-6 Construct development of lateral surfaces.6.Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 6.1 Methods of Development06		5.2 Isometric Axis				
5.4 Isometric view and Isometric Projection 5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces) 6 Course OutcomeCCF108-6 Construct development of lateral surfaces. 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16 16		5.3 Isometric scale	06	16		
5.5 Conversion of Orthographic Views into Isometric View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces) Course OutcomeCCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16		5.4 Isometric view and Isometric Projection				
View/Projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces) Image: Course OutcomeCCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces Image: Course Outcome CCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces Image: Course Outcome CCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces Image: Course Outcome CCF108-6 Construct development of lateral surfaces. 6. Developments of Lateral surfaces of right solids Cube, Prism, Official cube, Prism, Prism, Prism, Prism, Prism,		5.5 Conversion of Orthographic Views into Isometric				
Course OutcomeCCF108-6 Construct development of lateral surfaces. 6. Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16		View/Projection(Including rectangular, cylindrical objects,				
Course OutcomeCCF 108-6 Construct development of lateral surfaces. 6. Developments of Surfaces 6.1 Methods of Development 6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16	C	representation of slots on sloping as well as plane surfaces)		<u> </u>		
6.Developments of Surfaces6.1 Methods of Development6.2 Developments of Lateral surfaces of right solids Cube, Prism,0616	Cours	Se OutcomeCCF108-6 Construct development of lateral surfaces.				
6.1 Methods of Development6.2 Developments of Lateral surfaces of right solidsCube, Prism,0616	6.	Developments of Surfaces				
6.2 Developments of Lateral surfaces of right solids Cube, Prism, 06 16		6.1 Methods of Development				
		6.2 Developments of Lateral surfaces of right solids Cube, Prism,	06	16		
Cylinders, Pyramid and Cone		Cylinders, Pyramid and Cone				
6.3 Applications of Development such as Tray, Funnel, Chimney,		6.3 Applications of Development such as Tray, Funnel, Chimney,				
Pipe ends etc.		Pipe ends etc.				
Total 32 80		Total	32	80		

1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination:

Тор	Name of tania	Distribut	ion of marks level-wise)	(Cognitive	Course	Total Morely
No.	Name of topic	Rememb er	Understan d	Applica- -tion	Outcome	s
1	Orthographic projection	04	02	02	CCF108-1	08
2	Sectional Views.	04	04	12	CCF108-2	20
3	Free Hand Sketches	02	04	04	CCF108-3	12
4	Missing Views	02	04	02	CCF108-4	08
5	Isometric Projection	04	04	08	CCF108-5	16
6	Developments of Surfaces	04	12	02	CCF108-6	16
	Total	20	30	30		80

B. TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr. no	Laboratory experience	Skills developed	Course Outcome
1	Orthographic projection (1 Sheet)	To develop drawing ability to draw Orthographic projection	CCF108-1
2	Orthographic projection Using CAD (1 Sheet)	To develop CAD software skill in drawing and design.	CCF108-1
3	Sectional Views. (1 Sheet)	To develop drawing ability in sectional views	CCF108-2
4	Free Hand Sketches (1 Sheet)	To develop ability to draw free hand sketches of machine components, screw thread profile, riveted and welded joints	CCF108-3
5	Missing Views (1 Sheet)	To develop ability to draw Missing views and convert given view into sectional view.	CCF108-4
6	Isometric Projection (1 Sheet)	To develop ability to draw Isometric projection	CCF108-5
7	Development of Surfaces (1 Sheet)	To develop drawing ability in Development of surfaces of cone, prism, pyramid and cylinder	CCF108-6

Criteria for Continuous Assessment of Practical work and Progressive Skill Test: a) Continuous Assessment of Drawing Practical

Every practical Sheet shall be assessed for **25** marks as per criteria given below:

Sr	Criteria	Marks allotted
No.		
1	Attendance	05
2	Preparedness	05
3	Correctness and understanding	10
4	Line work and neatness	05
	Total	25

b)Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25marks shall be conducted as per criteria given below:

Sr	Criteria	Marks allotted
No.		
1	Correctness and understanding	10
2	Line work and neatness	05
3	Dimensioning and judgment without measurement	05
4	Proper use of instrument	05
	Total	25

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Computer, printer etc.
- 5. Question Bank

REFERENCE MATERIAL :

a) Reference Books:

Sr. No.	Author	Title	Publisher
1.	N. D. Bhatt	Engineering Drawing	Charotar Publishing House
			2010
2.	Amar Pathak	Engineering Drawing	Dreamtech Press, 2010
3.	D.Jolhe	Engineering Drawing	Tata McGraw Hill Edu., 2010
4.	M.B.Shah,	Engineering Drawing	Pearson, 2010
	B.C.Rana		
5.	K. Venugopal	Engineering Drawing and	New Age Publication, Reprint
		Graphics + AutoCAD	2006
6.	IS Code, SP – 46	Engineering Drawing Practice	

b) Web References:

1)http://www.design-technology.info/IndProd/drawings/

2)http://graphicalcommunication.skola.edu.mt/syllabus/engineering-drawing/

3)http://en.wikipedia.org/wiki/Engineering_drawing

4)http://www.engineeringdrawing.org/

5)<u>http://www.teachengineering.org/view_activity</u>

6)www.howtoread.co.in/2013/06/how-to-read-ed.html

7) http://www.slideshare.net/akhilrocker143/edp

8)<u>http://www.24framesdigital.com/pstulpule</u>

COURSE ID:

Course Name	: APPLIED MECHANICS
Course Code	: CCF110
Course Abbreviation	: FAPM

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <*nil* >

Teaching Scheme :

8		
Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	00

Evaluation Scheme :

Madaaf	Progressiv	ve Assessment	Term End H		
Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	1.25 marks for each practical2.0ne PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25	125

RATIONALE :

Applied mechanics mainly deals with engineering problems regarding equilibrium and motion of material bodies under the action of mechanical and gravitational forces. As most branches of engineering come across situations involving bodies subjected to mechanical and gravitational forces, this course becomes one of the basic courses in engineering.

COMPETENCY

Apply principles of applied mechanics to solve engineering problems as follows :

Cognitive : Understanding and applying principles of mechanics to engineering problems

Psychomotor : i) Operating simple lifting machines ii) drawing graphic constructions

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

COURSE OUTCOMES :

CCF110-1 Determine resultant of coplanar force systems
 CCF110-2 Solve problems on bodies in equilibrium with and without friction
 CCF110-3 Solve problems on statics graphically
 CCF110-4 Solve problems on centre of gravity of laminas and solids
 CCF110-5 Solve problems on motion using kinematic and kinetic equations
 CCF110-6 Solve problems on simple lifting machines

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
Competency: Apply principles of applied mechanics to solve engineering problems.	3	1	3	2	-	-	-	2	1	2	-	-	1
CCF110-1 Determine resultant of coplanar force systems	3	1	-	-	-	-	-	2	1	2	-	-	1
CCF110-2 Solve problems on bodies in equilibrium with and without friction	3	1	3	3	-	-	-	2	1	2	-	-	1
CCF110-3 Solve problems on statics graphically	2	1	3	1	-	-	-	2	1	1	-	-	1
CCF110-4 Solve problems on centre of gravity of laminas and solids	3	1	2	2	-	-	-	2	1	2	-	-	1
CCF110-5 Solve problems on motion using kinematic and kinetic equations	3	1	2	1	-	-	-	2	1	2	-	-	1
CCF110-6 Solve problems on simple lifting machines	2	1	1	1	-	-	-	2	1	1	-	-	1

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

CONTENT :

A) THEORY :

	Section I		
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course Outcome CCF110-1 Determine resultant of coplan	nar force sys	tems
1	 Resolution and Composition of Forces 1.1 Definition and meaning of the terms mechanics, applied mechanics, particle, rigid body, mass, force, weight 1.2 Attributes of a force : Magnitude, direction, sense and position. Principle of transmissibility. Graphical representation of force 1.3 Force systems : Definition and types of force systems like coplanar and non-coplanar. Types of coplanar force systems like concurrent, non- 	10	12
	concurrent, parallel, non-parallel. Field examples of various force systems		
	 1.4 Moment of a force about a point 1.5 Couple : properties of couple. Field examples of moments and couples 1.6 Resolution of a force into two orthogonal and oblique components 1.7 Composition of forces : Definition and meaning of resultant of a force system. Law of parallelogram of forces. Varignon's theorem. Determination of resultant of coplanar force systems by analytical method 		
Cou	rse Outcome CCF110-2 Solve problems on bodies in equilibrium	n with and v	vithout friction
2.	 Equilibrium of Bodies 2.1 Definition of equilibrium of a body and equilibrant. Conditions of equilibrium. Law of moments. 2.2 Supports : Definition, types and reactions. Free-body diagrams of bodies. Field examples. 2.3 Lami's theorem. Field examples. 2.4 Beams : Definition, types and field examples. Types and field examples of loads. Problems on support reactions of statically determinate beams carrying concentrated loads, uniformly distributed loads and concentrated moments (analytical method) 2.5 Statically determinate problems on bodies in equilibrium (analytical method) 	10	10
	Course Outcome CCF110-3 Solve problems on static	s graphically	
3	Graphic Statics 3.1 Advantages and limitations of graphical methods. Bow's	06	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
	Course Outcome CCF110-1 Determine resultant of coplan	nar force sys	stems		
	notation. Space diagram, vector diagram				
	3.2 Parallelogram, triangle and polygon laws of forces				
	3.3 Problems on resultant of concurrent force systems				
	3.4 Funicular polygon. Problems on resultant of non-current force systems				
	3.5 Problems on reactions of statically determinate beams with simple and hinged supports carrying concentrated loads				
4	Friction	06	10		
	4.1 Definition of friction. Static and dynamic friction. Laws of friction. Coefficient of friction. Angle of repose, Angle of friction. Field examples.				
	4.2 Problems involving bodies on horizontal and inclined rough surfaces and ladders.				
	Total	32	40		
Semes half ti marks	Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.				

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course Outcome CCF110-4 Solve problems on centre of gravit	y of laminas	and solids
5	 Centroid and Centre of Gravity 5.1 Definition and field applications of centroid and centre of gravity 5.2 Centroid of standard line figures. Problems involving composite figures made up of standard line figures 5.3 Centroid of standard laminas. Problems involving composite laminas made up of standard laminas 5.4 Centre of gravity of standard solids. Problems involving simple composite solids made up of standard solids. 	08	08
	Course Outcome CCF110-5 Solve problems on motion using kinema.	tic and kinetic	equations
6	 Rectilinear Motion 6.1 Definition of motion, dynamics, kinematics, kinetics, displacement, speed, velocity, acceleration, motion under gravity. Simple problems with uniform acceleration. Field examples 6.2 Newton's laws of motion. Simple problems 6.3 Definition of momentum. Law of conservation of momentum. Simple problems 	08	08
7	 Angular Motion 7.1 Definition of angular motion, angular displacement, angular velocity, angular acceleration, torque, moment 	04	06

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)	
	of inertia. Field examples			
	7.2 Kinematic and kinetic equations of angular motion.			
	Simple problems with uniform angular acceleration			
8	Work, Power, Energy	04	08	
	8.1 Definition of work done by a force. Work done by			
	torque			
	8.2 Definition of energy. Forms of energy. Law of			
	8.3 Definition of power			
	8.4 Simple problems on work power and energy			
	Course Outcome CCF110-6 Solve problems on simple 1	iftino machi	nes	
0	Simple Lifting Machines		10	
	 5.1 Definition of simple lifting machine, load, effort, mechanical advantage, velocity ratio, efficiency at a load. Field examples 5.2 Law of machine, maximum mechanical advantage, maximum efficiency, reversibility or non-reversibility of a machine at a load 5.3 Friction in machine, ideal machine, effort lost in friction, ideal effort, ideal load 5.4 Problems on simple lifting machines.(Problems or questions on any particular machines are not expected; they shall be covered in practicals) 			
	Total	32	40	
Seme half ti marks	Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

Торі		Distribution of marks (Cognitive level-wise)				Total
c No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Marks
1	Resolution and Composition of Forces	02	04	06	CCF110-1	12
2	Equilibrium of bodies	02	04	04	CCF110-2	10
3	Graphics Statics	02	02	04	CCF110-3	08
4	Friction	02	04	04	CCF110-2	10
5	Centroid and Centre of Gravity	02	02	04	CCF110-4	08
6	Rectilinear Motion	02	02	04	CCF110-5	08
7	Angular Motion	02	02	02	CCF110-5	06
8	Work, Power, Energy	02	02	04	CCF110-5	08
9	Simple Lifting Machines	02	04	04	CCF110-6	10
TOTAL		18	26	36		80

Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual for Applied Mechanics* developed by the Institute in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Collection and presentation of four graphics/ videos on field applications of mechanics	 Information collection and presentation Motivation through field exposure 	CCF110-1 to CCF110-6
2-7	 Experiments on equilibrium of bodies : (any six) 1. Verification of law of polygon of forces 2. Verification of law of parallelogram of forces 3. Verification of Varignon's theorem of moments for non-concurrent force system 4. Verification of Lami's theorem 5. Determination of reactions of beam 6. Determination of coefficient of friction and verification of laws of friction 7. Determination of centroid and centre of gravity 	 Self learning ability using laboratory manual Measuring dimensions and angles Applying concepts studied Plotting and interpreting graphs Drawing real view diagrams of machine Time management and team working skills Presentation skills 	CCF110-2 CCF110-4

8-11	 Experiments on simple lifting machines: (any four) Study of differential axle and wheel Study of simple screw jack Study of worm and worm wheel Study of single gear crab Study of double gear crab Study of Weston's differential pulley block Study of two sheaves and three sheaves pulley block Study of worm geared pulley block 	 Studying mechanism of machine Deriving expression for velocity ratio of machine Measuring dimensions of machine parts using thread, etc. Taking readings of loads and efforts Plotting and interpreting graphs Drawing real view diagrams of machine Time management, team working and presentation skills 	CCF110-6
12	Graphic Statics : One problem each on concurrent force system, parallel force system, non-current non-parallel force system and reactions of heam on graph	 Planning paper space Choice of proper scale Drawing and presentation 	CCF110-3
	papers	4. Applying concepts studied	

C) INDUSTRIAL EXPOSURE :

(Included in Laboratory Manual for Applied Mechanics)

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Every chapter of theory syllabus
2.	Field examples of course application	Term-work assignment

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

b) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Developmentor	Operating Skills	10
Psychomotor	Drawing / drafting skills	10
Affastiva	Discipline and punctuality	10
Allective	Decency and presentation	10
	TOTAL	50

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted as per criteria given in *Laboratory Manual for Applied Mechanics*

Final marks of term work shall be awarded as per Assessment Pro-forma II.

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Dixit, Nehate,	Text Book on Applied Mechanics	Vision
	Shaikh		
2.	Sunil Deo	Text book on Engineering Mechanics	Nirali
3.	Bhavikatti and	Engineering Mechanics	Peerson
	Rajashekharappa		
4.	Mariam & Mariam	Engineering Mechanics	John Wiley & Sons Inc
5.	Beer & Johnston	Vector Mechanics : Statics and Dynamics	McGraw Hill Inc

b) Websites

i) http://en.wikipedia.org/wiki/Applied_mechanics

* * *

COURSE ID : Course Name : WORKSHOP PRACTICES – 1 Course Code : CCF112 Course Abbreviation : FWSB

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	Nil	
		04
Practical	04	

Evaluation Scheme :

	Progressive Assessment Term End Examination					
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination	Total
Details of Evaluation	Average of two tests of 20 marks each	i) 25 marks foreach practicalii) One PST of25 marks	Term End Theory Exam (03 hours)	As per Proforma III		
Marks	Nil		-	50		50

RATIONALE:

Workshop practices I mainly deals with Fitting, Plumbing and Wood working. A technician has to work in such environment with his peers, superiors and subordinates for a major part of his life. Therefore the emphasis on the practical work is needed for the primary experience of working in the team.

COMPETENCY :Prepare a simple job using wood working, plumbing and welding technique.

Cognitive :	Understand various trade practices in engineering.
Psychomotor :	Use of various tools in Fitting, Wood working, Plumbing shop
Affective :	Develop attitude of i) Interpret drawing ii) Safety

COURSE OUTCOMES :

CCF 112-1 Select different types of wood material.CCF 112-2 Select different types of tools used in workshop.

CCF 112-3 Preparing simple components in workshop.

CCF 112-4 Interpret drawing.

CCF 112-5 Practicing safety in workshop.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competen cy:	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-1	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-2	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-3	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-4	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-5	1	-	3	-	-	-	-	3	-	-	2	-

Course Contents :- TERM WORK

Sr. No.	Topics/ Sub-Topics		Practical (Hours)/ Evaluati on(Mark s)	Skills/ Competencies to be developed	Course outcome
1	Fitting	Shop :			
	a)	Demonstration of different	20/16	a)Study of fitting tools,	
		fitting tools, drilling and		identifying materials	
		power tools.		b)Measuring	
	b)	Demonstration of different		dimensions	
		operations like marking,		c)Interpretation of	
		filing, cutting, drilling,		drawing	CCF2 to CCF5
		tapping etc.		d) Selection of tools	
	c)	One simple fitting job (Male		e) Time management	
		Female assembly type		and observing safety	
		involving practice of filing,		habits	
		drilling, cutting, tapping etc.		f) Operate drilling m/c,	
				saw m/c	
	Plumb	oing shop :-	20/16	a)Study of plumbing	
		a) Demonstration of tools.		tools, identifying	CCF2 to CCF5
		b) One job on simple pipe		materials	
		joint with nipple coupling for		b)Interpretation of	
		Standard pipe, Pipe		drawing	
		threading using standard die		c) Threading with dies	
2		set		on pipe	

		(One job per one group of		d) Time management	
		04 students).		and observing safety	
		c) Demonstration of PVC		habits	
		pipe joint with various PVC		e)Selection of pipe	
				joint &	
		fittings& accessories.		fittings .	
3	Wood	Working shop :-	24/18	a) Study of wood	
		Demonstration of different		working tools,	
		wood working tools		Identifying materials	CCF 1 to CCF 5
	a)	&machines		b)Measuring	
	b)	Identify, select & use various		dimensions	
		Marking, Measuring,		c)Interpretation of	
		Cutting,		drawing	
		Holding & Striking tools &		d) Operating planning,	
		equipments.		cutting, drilling	
		Operate different machines		machines.	
	c)	& equipments in respective		e) Time management	
		shop.		and observing safety	
		^		habits	
		Know basic workshop			
	(b	processes.		f)Prepare furniture or	
		F		article with carpentry	
	e)	Demonstration of different		joints	
	()	wood working processes			
		like Diamaina Marking			
		Chicaling, Creassing,			
		Turning, Grooving,			
		Turning			
		of wood etc.			
		a) One simple job			
		based on the above			
		processes for 04 to			
		06 students group.			
		Measure			
		dimensions			

The students will submit the following.

Workshop record book showing the details of the job viz. Drawing, Raw material size, time required completing the job.

The journal consisting of the neat sketches, specifications use of the hand tool, and hand operations based on the demonstration in all the trades during the practical work.

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

a) Assessment Criteria for Term work :

1) Continuous Assessment of Fractical Assignments .								
Every practical assignment shall be assessed for 50 marks as per following criteria :								
	Domain	Particulars	Marks out of 50					
	Comitivo	Understanding	05					
	Cognitive	Application	05					
	Darrahamatan	Operating Skills	10					
	Psychomotor	Drawing / drafting skills	10					
	Affective	Discipline and punctuality	10					
	Allective	Decency and presentation	10					
		50						

i) Continuous Assessment of Practical Assignments :

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

Instructional Strategies :-

Demonstration during Practical. Workshop Record Book

Teaching and learning resources:-

Shop Demonstration Hands on training on machine

Reference books

Author	Title	Publisher
S. K. Hajra Chaudhary,	Elements of workshop Technology -	Media Promoters and
Bose, Roy	Volume I & II	Publishers limited
B.S. Raghuvanshi	Elements of workshop Technology -	Dhanpat Rai & Co.
	Volume I & II	

Websites:

- 1) <u>http://nptel.ac.in</u>
- 2) www.egr.msu.edu/~pkwon/me478

COURSE ID :

Course Name	: WORKSHOP PRACTICES – 2
Course Code	: CCF116
Course Abbreviation	: FWSF

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s)

: CCE112 Workshop Practices – 1

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	Nil	02
Practica	102	02

Evaluation Scheme :

	Progressive Assessment		Term	Term End Examination			
Mode of Evaluation	Theory	Practical	Theory	Term Work	Oral	Total	
			Examination		Examination		
	Average of	i) 25 marks for			-		
			Term End	As per			
Details of	two tests of	each practical					
			Theory Exam	Proforma			
Evaluation	20 marks	ii) One PST of					
			(03 hours)	III			
	Each	25 marks	-				
Marks	Nil		-	50		50	

RATIONALE:

The workshop practices II mainly deals with Wood working, Sheet metal, Welding and Smithy work are commonly used in Engineering Industry. A technician has to work in such environment with his peers, superiors and subordinates for a major part of his life. Therefore the emphasis on the practical work is needed for the primary experience of working in the team.

Such working upgrades the mental and manual abilities / skills of using efficiently the basic tools in most of the industries. The students are required to supervise, maintain equipments, where he needs the knowledge of basic workshop skills such as welding, soldering, plumbing, drilling, taping, etc.

COMPETENCY :

Prepare a simple job using wood working, sheet metal, Welding and Smithy technique.

- **Cognitive** : Understand various trade practices in engineering
- Psychomotor:Use of various tools in wood working, sheet metal, Welding and smithy shopAffective:Develop attitude of i) Interpret drawing ii) Safety practices

COURSE OUTCOMES :

- CCF 116-1 Select different types of sheet metal and Welding tools.
- CCF 116-2 Prepare the wood working, sheet metal, Welding and smithy components.
- CCF 112-3 Interpret drawing.

CCF 112-4 Practicing safety in workshop.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competen												
cy:	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-1	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-2	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-3	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-4	1	-	3	-	-	-	-	3	-	-	2	-
CCF112-5	1	-	3	-	-	-	-	3	-	-	2	-

Course Contents :- TERM WORK

Sr. No.	Topics/ Sub-Topics	Practical (Hours)/ Evaluation (Marks)	Skills/ Competencies to be developed	Course outcome
1	Wood Working shop :-	09/15		CCF 1 to CCF 4
	 a) Demonstration on Wood turning lathe involving different operations. b) One job on Tenon and Mortise joint 		 a) Measuring dimensions b)Interpretation of drawing c) Operations on Wood turning lathe, drilling machines d) Time management and 	
			observing safety habits	
2	 Sheet Metal Shop :- a) Demonstration of different is metal tools and machines. b) Demonstration of sheet metal operations like Sheet cutting, Bending, Edging, End curling, Lancing, Riveting etc. 	09/15 sheet	 a)Study of sheet metal tools, identifying materials b)Measuring dimensions c)Interpretation of drawing d) Operating sheet cutting bending machines e) Time management and observing safety habits 	CCF 1 to CCF 4
	c) One Job involving sheet r	netal	f) Prepare utility article	

	operations from Dustbin, Letter			
	Box Tray Bucket etc			
	2 on, 11 uj, 2 uono cool			
3	Welding shop :-	07/10		
	 a) Demonstration of various welding tools, joints of metals, type of welding machines. b) Demonstration of arc welding techniques. c) How to use current setting, Earthing connection etc. and any one job composite job involving Butt, Lap joint from the following pieces of work - 1) Window frame. 2) Grill. 3) Sanitary window frame. 4) Supporting frame. 5) Stool frame. 6) Bench frame etc. 		 a) Study of welding tools, Identifying materials b)Measuring dimensions c) Interpretation of drawing d) Operating welding machines. e) Time management and observing safety habits 	CCF 1 to CCF 4
4	Smithy shop :-		a)Studying forging tools,	
	 a) Demonstration of different forging tools. b) Demonstration of different forging processes like Shaping, fullering, setting down operations etc. c) One job like hook, flat chisel or any hardware item Note - One job of standard size (salable/marketable article of per student) 	07/10	Identifying materials b)Measuring dimensions c)Interpretation of drawing d) Selection of tools e)Time management and observing safety habits	CCF 1 to CCF 4

The students will submit the following.

Workshop record book showing the details of the job viz. Drawing, Raw material size, time required completing the job.

The journal consisting of the neat sketches, specifications use of the hand tool, and hand operations based on the demonstration in all the trades during the practical work.

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

- a) Assessment Criteria for Term work :
 - i) Continuous Assessment of Practical Assignments :

C	lical assignment s	per following criteria :	
	Domain	Particulars	Marks out of 50
_	Cognitivo	Understanding	05
	Cognitive	Application	05
	Developmentor	Operating Skills	10
	rsychomotor	Drawing / drafting skills	10
	Affactivo	Discipline and punctuality	10
	Affective	Decency and presentation	10
		50	

Every practical assignment shall be assessed for 50 marks as per following criteria :

ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 50 marks shall be conducted Final marks of term work shall be awarded as per Assessment Pro-forma III.

Instructional Strategies :-

Demonstration during Practical's. Workshop Record Book.

Teaching and learning resources:-Shop Demonstration

Hands on training on machine.

Reference Books :-

Author	Title	Publisher
S. K. Hajra Chaudhary,	Elements of workshop Technology –	Media Promoters and
Bose, Roy	Volume I & II	Publishers limited
B.S. Raghuvanshi	Elements of workshop Technology –	Dhanpat Rai & Co.
	Volume I & II	

Websites:

- 1) http://nptel.ac.in
- 2) www.egr.msu.edu/~pk

LEVEL – II LIFE SKILLS AND PROFESSIONAL SKILLS COURSES

COURSE ID:

Course Name	: GENERIC SKILLS
Course Code	: CCF201
Course Abbreviation	:FGNS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <*nil* >

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	04

Evaluation Scheme:

Mode of	Progre	essive Assessment	Te	Total		
Evaluation	Theory	Practical	Theory	Practical **	TW	
Detailsof Evaluation	- Nil -	One mid-semester Skill Test(2 hrs) * of 25 marks	- Nil -	Term End Practical Exam (2 hrs)	Pro- forma VI	
Marks	- Nil -		- Nil -	50	25	75

** Practical Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher of different classfrom the Institute) and marks to be entered as per Proforma V.

RATIONALE:

Acquisition of technical and entrepreneurial competencies is founded on certain generic skills that are fundamentally essential for all disciplines of technology. Considering the age group and socioeconomical background of the students of the Institute, a set of minimum essential generic skills has been identified and categorized as i) Concentration skills, ii) Language skills, iii) Learning Skills, iv) Aesthetic Skills, v) Behavioral Skills and vi) Creativity Skills. These generic skills will be studied and practiced in this course. Communication Skills form another major category of generic skills which shall be studied in separate course named *Communication Skills*. For mastery and perfection in these skills, consistent practice and an integrated application is necessary in all subjects of the Programme. Generic skills are essential to improve the overall quality of learning of the student for all the subjects.

COMPETENCY :

Apply generic skills to achieve refinement in overall development of personality as follows:

Cognitive : Understanding and applying generic skills in various situations

Psychomotor : i) Use of proper concentration ii)analyzing routine activity for formal and informal learning iii) Use of correct vocabulary. iv) use of aesthetic skills in all dimensions of life.

Affective : Attitude of i) concentration ii)confidence iii) manners iv) neatness v) aesthetic presentation

COURSE OUTCOMES :

CCF201-1 Enlist and appreciate generic skills necessary for a technician

CCF201-2Attain concentration through thought analysis, omkar, pranayam, prayer and meditation

CCF201-3Analyze his own learning process with reference to domain analysis and FIPN model

CCF201-4 Exhibit language skills viz. vocabulary, recitation, sentence making skills.

CCF201-5 Exhibit learning skills, studying skills and technical skills viz. calculating, graphic skills

CCF201-6Exhibit aesthetic skills, behavioral skills and creativity skills

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competency	2	2	3	-	1	-	2	2	2	3		
CCF201-1	2	2	1	-	2	-	-	2	2	2		
CCF201-2	2	2	2	-	2	1	1	2	2	2		
CCF201-3	2	2	2	-	1	1	2	2	2	3		
CCF201-4	2	2	2	-	2	-	2	2	2	2		
CCF201-5	2	2	2	-	2	-	2	2	2	2		
CCF201-	2	1	1	-	1	-	1	2	2	2		

CONTENT:

A. THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)				
Course Outcomes CCF201-1 Enlist and appreciate generic skills necessary for a tech						
1	Overview of generic skills					
	 1.1 Definition of generic skills, life skills, soft skills. Difference between generic skills and specialized skills 1.2 Important generic skills for technicians: Concentration skills, learning 					
	skills, language skills, communication skills, aesthetic skills, behavioral skills, creativity skills					
	1.3 Importance of generic skills					
Course Outcon	nes CCF201-2Attain concentration through thought analysis, omkar, pranaya	am, prayer and				
	meditation					
2	Concentration Skills	06				
	2.1 Concentration of mind : Meaning and importance. Hurdles and common remedies.					
	2.2 Thoughts : Intensity, speed and duration of thoughts. Positive, negative and neutral thoughts. Emotions. Management of thoughts.					
	2.5 Concentration skills : Breatning exercises and <i>pranayam</i>					

	2.4 Concentration skills : Chanting <i>omkar</i>	
	2.5 Concentration skills : Prayer - Daily input of positive Thoughts	
	2.6 Concentration skills : Meditation	
Course Ou	Itcomes CCF201-3 Analyze his own learning process with reference to domain	analysis and
	FIPN model	
3	Learning Skills	08
	 3.1 Fundamentals of Learning : Definition, characteristics and rewards of learning. Affective, cognitive and psychomotor domains of learning. Barriers in learning. FIPN analysis. 3.2 Process of Learning : Reception, understanding, consolidation, retrieval, internalization, application, reinforcement and enhancement 3.3 Learning Skills: Skills of observing, listening, reading, notes taking, 	
	 memorizing, problem solving, graphic, experimenting, surveying, calculating skills, Cognitive skills. 3.4 Studying skills :Planning and scheduling, Methods of study as per Nature of subject content. 3.5 Self-motivation: Meaning and importance. Improving self-motivation 	
	through activities like inspiring case studies, web search & presentation,	
	technical quiz/games, group studying, making videos, industry exposure	
Course Ou	tcomes CCF201-4 Exhibit language skills viz. vocabulary, recitation, sentence	making skills
4	Language Skills	06
	4.1 Vocabulary. Pronunciation. Spellings. Recitation.4.2 Listening and recitation.4.3Word games.	
	Course Outcomes CCF201 -6Exhibit aesthetic skills, behavioral skills and creativity skills	
5	Aesthetic Skills	02
	5.1 Sense of aesthetics. Appearance. Neatness. Decency. Sense of colours and graphics5.2 Application of aesthetics in appearance, work, note book and paper writing, submission work	
	Course Outcomes CCF201 -6 Exhibit aesthetic skills, behavioral skills and creativity skills	
6	Behavioral Skills	04
	6.1Manners and etiquettes. Discipline. Sincerity. Morales. Politeness. Social and civic sense. Assertion without aggression.	
Course Outc	omes CCF201-6 Exhibit aesthetic skills, behavioral skills and creativity skills	
7	Creativity Skills	04
	7.1 Meaning and importance of creativity.7.2 Doing things creatively.	
	TOTAL	32

B. TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work detailed in the *Workbook on Generic Skills* developed by the Institute in practical sessions of batches of about 22 students:

Sr. No.	Title of the Lab work	Skills / Competencies to be developed	Course Outcome
1.	Introduction Game	Self-expression, inter-personal rapport	CCF201-1
2.	Concentration Skills - 1: Chanting of Omkar	Concentration	CCF201-2
3.	Concentration Skills - 2: Breathing exercises	Concentration	CCF201-2
4.	Concentration Skills - 3: Prayer	Concentration, recitation, positive thinking	CCF201-2
5.	Concentration Skills - 4: Meditation	Concentration, thought management	CCF201-2
6.	Language Skills - 1 : Vocabulary Exercise	Vocabulary improvement	CCF201-4
7.	Language Skills - 2 : Recitation Exercise	Pronunciation, language acquaintance	CCF201-3 & 4
8.	Language Skills - 3 : Grammar	Language skills	CCF201-3 & 4
9.	Learning Skills - 1 : Domain Analysis of an activity	Understanding learning domains	CCF201-3 & 4
10.	Learning Skills - 2 : FIPN Analysis of Learning	Learning analysis	CCF201-3 & 4
11.	Learning Skills - 3 : Reading and Notes taking	Effective reading and notes taking	CCF201-3 & 4
12.	Learning Skills - 4 : Listening and Notes taking	Effective listening and notes taking	CCF201-3 & 4
13.	Learning Skills - 5 : Studying Skills	Effective self-studying	CCF201-5
14.	Technical Skills - 1 : Calculating Skills	Efficient use of calculator	CCF201-5
15.	Technical Skills - 1 : Text-graphic Conversion	Graphic and language skills	CCF201-5
16.	Aesthetic Skills	Attitude of aesthetic presentation	CCF201-6
17.	Behavioral Skills	Behavior, mannerism and etiquettes	CCF201-6
18.	Creativity Skills	Attitude of creativity and innovation	CCF201-6
19.	Self-motivated Activities	Self-motivation Skills	CCF201-6

C. INDUSTRIAL EXPOSURE:

(Included in Workbook on Generic Skills)

SN	Mode of Exposure	Торіс
1.	Self-motivated Activities	Industrial survey, information collection, Biographies of
		industrialists, etc.
2.	Recitation Exercises	Articles on industrial scenario and issues
3.	Domain Analysis	Analysis of field / industrial activities

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

a) Term work :

i) Continuous Assessment of Practical Assignments:

Domain	Particulars	Marks out of 25
Cognitivo	Understanding	02
Cognitive	Application	02
Davahamatan	Presentation Skills	04
Psychomotor	Drafting skills	05
Affactiva	Discipline and punctuality	06
Allective	Decency	06
	TOTAL	25

Every practical assignment shall be assessed for 25 marks as per criteria given in *Workbook on Generic Skills*.

ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Workbook on Generic Skills*

Final marks of termwork shall be awarded as per Assessment Pro-forma VI

b) Term-end Practical Examination :

Term-end Practical Examination shall be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute) as per the following criteria :

Skills >	Concen- tration Skills	Language Skills	Learning Skills	Technical Skills	Aesthetic, behavioral and creativity skills	Total	Marks converted out of
Marks >	20	20	20	20	20	100	50

INSTRUCTIONAL STRATEGIES:

InstructionalMethods:

1. Lectures cum Demonstrations 2. Classroom practices

Teaching and Learning resources:

1. Chalk board2. LCD presentations3. Audio presentations4. Item Bank**REFERENCE MATERIAL :**

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	K. Sudhesh	Development of Generic Skills	Nandu Printers & Pub,M'bai
2.	Kulkarni/Sharma	Independent Study Techniques	
3.	E.H.McGrath	Basic Managerial Skills for all	McGraw Hill Pub., New Delhi
4.	Sahukar&Bhalla	The book of Etiquette and	Pustak Mahal, New Delhi
		Manners	
5.	Jeanne E.O.	Human Learning	Pearson Publishers, Mumbai
6.	Kenneth/Dubois	Learning to Learn	Pearson Publishers, Mumbai
7.	Fred Luthans	Organizational Behavior	McGraw-Hill Higher Edu.

b) Websites

i) www.mindtools.com

ii) www.samcerto.com

iii) www.stress.org.uk

iv) www.yogapoint.com

* * *

COURSE ID:

Course Name	:	COMMUNICATION SKILLS
Course Code	:	CCF202
Course Abbreviation	:	FCMS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <*nil* >

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	04

Evaluation Scheme:

Mode of	Progressive Assess	ment		Total		
Evaluation	Theory	Practical	Theory	Practical *	TW	Total
Detailsof Evaluation	Average of two tests of 20 marks each to be converted out of 10 marks	One mid- term Skill Test(2 hrs)	Term End Theory Exam (1½ hours)	Term End Practical Exam (2 hours)	As per Profor ma II.	
Marks	10		40	25		75

* Practical Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute) and marks to be entered as per Proforma II.

RATIONALE:

Communication being an integral part of every personal and professional human activity, communication skills plays a fundamental role in education as well as technology. As a unanimous feedback from the industry in general, technicians need to be specially strengthened in generic communication skills for their effectiveness in profession and career. Considering the age group and socio-economical background of the students of the Institute, this course has been designed with a skill-oriented content with some necessary theoretical foundation. For mastery and perfection in these skills, consistent practice and integrated application is necessary in all subjects of the Programme.

COMPETENCY :

Apply principles of communication to communicate in formal and informal scenario as follows:

Cognitive : Understanding and applying principles of communication in various situations

Psychomotor : i) Use of correct pronunciation, tone, accent & intonation ii) writing formal letters, drafts, reports etc. iii) Use of correct nonverbal code in formal & informal situations iv)Speaking in formal & informal situations

Affective : Attitude of i) perfection ii) iii) confidence iv) punctuality v) aesthetic presentation

COURSE OUTCOMES :

CCF202-1 Identify his/her communication barriers CCF202-2converse and convince by speaking, deliver prepared & extempore speech CCF202-3 write letters, reports, resume in correct language CCF202-4 Make effective use of body language & graphic communication CCF202-5 Prepare and present simple media aided presentation CCF202-6 Prepare and face mock interview

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels :1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

					Program	ne Outco	mes POs	and PSOs				
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competency	-	-	-	-	2	-	3	1	3	1	-	-
CCF202-1	-	-	-	-	2	-	3	1	3	1	-	-
CCF202-2	-	-	-	-	2	-	3	1	3	1	-	-
CCF202-3	-	-	-	-	2	-	3	1	3	1	-	-
CCF202-4	-	-	-	-	2	-	3	1	3	1	-	-
CCF202-5	-	-	-	-	2	-	3	1	3	1	-	-
CCF202-6	-	-	-	-	2	-	3	1	3	1	-	-

CONTENT:

C. THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	COURSE OUTCOME CCF202-1 Identify his/her communication bar	rriers	
1	Fundamentals of Communication	08	12
	 1.1 Definition of communication by Newman and Peter Little. Importance communication 1.2 Model of communication: Sender-Message-Channel-Receiver- Feedback cycle. Encoding and decoding 1.3 Principles of effective communication 1.4 Types of communication 1.5 Barriers in communication COURSE OUTCOME CCF202-2 Converse and convince by specific 	eaking, delive	r prepared &
	extempore speech	1	
2	Oral Communication	06	06
	2.1 Principles and characteristics of oral communication.		
	2.2 Tone, pronunciation and accents. Grammar.		
	2.3 SpokenEnglish:Dialogue, conversation, prepared and		
	extempore speech, discussion, debate, feedback		
	COURSE OUTCOME CCF202-3 Write letters, reports, resume in co	rrect languag	e

3	Written Communication	06	06
	3.1 Principles and characteristics of written communication.		
	3.2 Writing reports, letters, resume and notes.		
	COURSE OUTCOME CCF202-4 Make effective use of body langu	uage & graphic co	ommunicat
4	Non-verbal communication	04	06
	4.1 Principles and characteristics of non-verbal	_	
	Communication.		
	4.2 Body language: visual, tactile, auditory, cultural.		
	Silence.		
	4.3 Graphic Communication: Visual illustration, technical		
	graphic communication.		
	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple medi	ia aided presenta	tion
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple medi Media Aided Presentation	ia aided presenta	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions	ia aided presenta	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation	ia aided presenta	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation 5.3 Use of presentation media: OHP, computer, MS	ia aided presenta	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation 5.3 Use of presentation media: OHP, computer, MS Power Point, LCD, board, charts	ia aided presenta	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation 5.3 Use of presentation media: OHP, computer, MS Power Point, LCD, board, charts COURSE OUTCOME CCF202-6Prepare and face mock interview	ia aided presenta 04	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation 5.3 Use of presentation media: OHP, computer, MS Power Point, LCD, board, charts COURSE OUTCOME CCF202-6Prepare and face mock interview Interview Techniques	ia aided presenta 04 v 04	tion 06 04
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation 5.3 Use of presentation media: OHP, computer, MS Power Point, LCD, board, charts COURSE OUTCOME CCF202-6Prepare and face mock interview Interview Techniques 6.1 Preparing for an interview	ia aided presenta 04 v 04	tion 06
5	graphic communication. COURSE OUTCOME CCF202-5Prepare and present simple media Media Aided Presentation 5.1 Media aids for presentation: strengths and precautions 5.2 Planning, preparing and making a presentation 5.3 Use of presentation media: OHP, computer, MS Power Point, LCD, board, charts COURSE OUTCOME CCF202-6Prepare and face mock interview 6.1 Preparing for an interview 6.2 Taking a mock interview and facing an interview	ia aided presenta 04 v 04 04	tion 06

Specification table for setting question paper for semester end theory examination:

Topic	Name of topic	Distribution	n of marks (Cogniti wise)	Course outcome	Total	
INO.	-	Remember	Understand	Application		Marks
1	Fundamentals of Communication	02	06	04	CCF202-1	12
2	Oral Communication	02	02	02	CCF202-2	06
3	Written Communication	02	02	02	CCF202-3	06
4	Non-verbal Communication	02	02	02	CCF202-4	06
5	Media aided presentation	02	02	02	CCF202-5	06
6	Interview Techniques	00	02	02	CCF202-6	04
	Total >>	10	16	14		40

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

D. TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in the *Workbook on Communication Skills* developed by the Institute in practical sessions of batches of about 22 students:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Characteristics of	Analysis of communication process	CCF202-1
	Communication Process		
2.	My Communication Barriers	Self analysis	CCF202-1
3.	Verbal Communication :	Improvement in vocabulary	CCF202-2
	Vocabulary		&3
4.	Oral Communication : Prepared	Preparing and delivery	CCF202-2
	Speech		
5.	Oral Communication :	Creative thinking and speaking	CCF202-2
	Extempore Speech		
6.	Oral Communication :	Listening, thinking and speaking	CCF202-2
	Conversation		
7.	Oral Communication : Group	Listening, thinking and convincing	CCF202-2
	Discussion		
8.	Oral Communication : Group	Listening, thinking and convincing	CCF202-2
	Debate		
9.	Written Communication :	Drafting	CCF202-3
	Drafting Skills		
10.	Written Communication :	Drafting	CCF202-3
	Writing formal and Informal		
	Letters		
11.	Written Communication :	Drafting with comprehension	CCF202-3
	Writing Reports		
12.	Written Communication :	Drafting	CCF202-3
	Writing Scripts		
13.	Non-verbal Communication :	Graphic skills	CCF202-4
	Graphic Communication		
14.	Non-verbal Communication :	Body language	CCF202-4
	Body Language		
15.	Using Presentation Aids	Using presentation aids	CCF202-5
16.	Interview Techniques	Facing interview	CCF202-6

E. INDUSTRIAL EXPOSURE:

(Included in Workbook on Communication Skills)

SN	Mode of Exposure	Торіс
1.	Oral and Written Communication Exercises	Industrial situations
2.	Recitation Exercises	Articles on industrial scenario and issues
3.	Interview Techniques Exercises	Industrial situations

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

c) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks as per criteria given in *Workbook on Communication Skills*.

Domain	Particulars	Marks out of 25
Comitivo	Understanding	02
Cognitive	Application	02
Describer and the m	Presentation Skills	04
Psycholiotor	Drafting skills	05
Affactive	Discipline and punctuality	06
Allective	Decency	06
	TOTAL	25

ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Workbook on Communication Skills*

Final marks of termwork shall be awarded as per Assessment Pro-forma II.

d) Assessment Criteria for Term-end Practical Examination:

Term-end Practical Examination shall be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute)as per the following criteria

Item >	Oral	Speech	Body Language	Language Grammar	Letter Writing	Total	Marks out of
Marks >	20	20	20	20	20	100	25

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher		
1.	K. Sudhesh	Development of Generic Skills	Nandu Printers & Pub, M'bai		
2.	B.V.Pathak	Communication Skills	NiraliPrakashan		

3.	Burgoon	Human Communication	SAGE Publications Inc.
	Michael		
4.	Geofrey Leech	A communicative Grammar of	Pearson Education ESL
	and Jansvartvik	English	
5.	Elizabeth	101 ways to better communication	Pustak Mahal
	Hiemey		
6.	Thomas Huckin	Technical Writing and	McGraww Hill College
	and Leslie	Professional Communication	Division

b) Websites

i) www.clrp.cornell.edu/workshops/pdf/communication_skills-web.pdf

- ii) http://depssa.ignou.ac.in/wiki/images/c/ca/Communication_skills_in_English.pdf www
- iii) http://www.cgg.gov.in/Handbook%20on%20Communication%20Skills.pdf

iv) http://www.stf-media.com/31-0-Presentations.html

COURSE ID:

Course Name	: PROFESSIONAL PRACTICES
Course Code	: CCF203
Course Abbreviation	: FPRP
TEACHING AND EVALUATIO	N SCHEME:
Pre-requisite Course(s)	: <nil></nil>

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	01	02
Practical	02	05

Evaluation Scheme:

Component	Progressive Assess	sment	Term	Tota		
Component	Theory	Practical	Theory	TW	OR*	1
Details and Duration		One mid- term Skill Test (2 hrs)	No Term End Theory Exam	As per proforma V	As per proforma VI	
Marks				25	50	75

* Oral Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute) and marks to be entered as per Proforma as above.

RATIONALE:

The course *Professional Skills* is in continuation of the courses *Generic Skills* and *Communication Skills* studied in semester I and II respectively. In order to be a successful technician in industry, a diploma holder is required to acquire certain professional skills. These skills shall be studied in this course. An overview and awareness about the world of industry has been provided in Chapter 1. Professional skills like leadership skills, team building, stress and conflict management, time management have been dealt with. Aptitude tests have been introduced. A study of major technological projects in the respective programme discipline has been included in the syllabus. Term work assignments of the course provide the student on-field activities as well as self-learning activities providing professional exposure in order to help develop professional skills.

COMPETENCY :

Apply principles of organizational behavioral science for professional skills as follows : **Cognitive :** Understanding and applying principles of effective technical communication **Psychomotor :** i) Speaking skills ii) writing skills iii) Body language skills **Affective :** Attitude of i) precision ii) accuracy iii) punctuality iv) aesthetic presentation

COURSE OUTCOMES :

CCE203-1 Awareness about industrial scenario of world and India CCE203-2 Awareness about professional skills like leadership, stress and conflict management, team building skills

CCE203-3 Awareness about major industrial projects and biographies of great industrial Personalities

CCE203-4 Awareness about professional and behavioral ethics

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	UTICIALI		a • 1. ong	,nt (LOW),	2. WIOUEI	ate (Wieur	um), 5. S	uostailittai (nign), -	. 110 0011		
Programme Outcomes POs and PSOs												
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competency:	-	-	-	-	1	-	2	2	1	-	-	-
CCE203-1	-	-	-	-	1	-	2	2	1	-	-	-
CCE203-2	-	-	-	-	1	-	2	2	1	-	-	-
CCE203-3	-	-	-	-	1	-	2	2	1	-	-	-
CCE203-4	-	-	-	-	1	-	2	2	1	-	-	-

CONTENT: F. THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)
1	 Industrial Development of India 1.4 Introduction to industrial revolution in the world 1.5 Brief history of industry in India 1.6 Broad categories of industries : Manufacturing industry, service industry 1.7 Present industrial scenario of India : Small scale, medium scale and major industries in the programme discipline 1.8 Major issues related to industrialization 	04
2	 Profession and Professional Skills 2.1 Difference in profession, occupation, business 2.2 Leadership : definition, styles and skills 2.3 Team Building : Types of teams. Characteristics of good team and effective teamwork 2.4 Conflict management : Definition and causes of conflict. Methods of resolution - negotiating, compromising, withdrawal, forcing, engagement 2.5 Self SWOT analysis as a professional technician 2.6 Aptitude test 2.7 Emotion Management and Interpersonal Skills : Use of yogic processes like yogasanas, yognidra, breathing exercises and pranayam, omkar, meditation for effective handling of emotions and interpersonal relations 	06
3	Industrial Personalities and Major Projectsa. Pioneers of Industrial development of India : Brief biography of Sir M. Visvesarrya and JRD Tata	06

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	 b. Biography and contribution of two great industrial personalities from programme discipline c. Study of 5 major technological projects in the programme discipline 	
	Total	16

G. TERM WORK Practical Exercises and related skills to be developed:

The term work shall consist of a journal containing write ups by students on the following assignments conducted in practical sessions of batches of about 22 students :

Sr No	Title of Practical Exercise	Skills / Competencies to	
51 140.		be developed	
1.	Information Search through internet on	Information search and	
	Industrial Scenario of India	interpretation skills	
2.	Information Search through actual visit to	Information search and	
	MIDCs on classification of industries	interpretation skills	
3.	Biography and contribution of Sir M.	Information search and	
	Visverayya and J.R.D.Tata	presentation skills	
4.	Biography and contribution of two	Information search and	
	eminent industrialists from programme	presentation skills	
	discipline		
5.	Individual SWOT analysis as a	Self-analysis skills	
	professional technician		
6.	Leadership	Leadership skills	
7.	Stress and Conflict Management	Stress and conflict	
		management skills	
8.	Aptitude test	Self-testing skills	
9.	Case study of a major technological	Case study skills	
	project in the programme discipline		
10.	Breathing exercises, pranayam, omkar	Attaining calmness of mind	CCF203-2
	chanting and meditation	and balance of emotions	

C. INDUSTRIAL EXPOSURE :

(Included in the contents of *Theory* and *Term work*)

SN	Mode of Exposure	Торіс
1.	Theory inputs and practical survey	TW Exercise No. 1 and 2
2.	Study of biographies of industrialists	TW Exercise No. 3 and 4
3.	Case study of major industrial project	TW Exercise No. 9

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION e) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks
ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted.

Final marks of term work shall be awarded as per Assessment Pro-forma V

f) Term End Oral Examination :

Term-end Oral Examination shall be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute).

INSTRUCTIONAL STRATEGIES: Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	EH McGrath, SJ	Basic Managerial Skills for all	McGraw Hill
2.	Prakash Iyer	The Secret of Leadership : Stories	
		to Awaken, Inspire and Unleash	
		the Leader Within	

b) Websites

i) en.wikipedia.org/wiki/Leadership

* * *

LEVEL – III BASIC TECHNOLOGY COURSES

COURSE ID :CE: APPLIED MATHEMATICSCourse Name: MEF301Course Abbreviation:FAMT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : CCF106 Teaching Scheme :

Teaching Scheme.		
Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	04

Evaluation Scheme :

	Progressive Asse	Tern	Total		
~	Theory	Tutorials	Theory	Practical	Total
Component Details and Duration	Average of two tests of 20 marks each	As mentioned in the syllabus	Term End Theory Exam (03 hours)	NIL	
Marks	20		80		100

RATIONALE:

Mathematics is an important pre-requisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of Mathematics is an effective tool to pursue and to master the applications in the engineering and technological fields. Applied mathematics is designed for its applications in engineering and technology. It includes integration, differential equation,. The connection between applied mathematics and its applications in real life can be understood and appreciated. Integral calculus helps in finding the area, mean value R. M. S value etc. Differential equation is used in finding curve, rectilinear motion. Statistics and probability will help a student to analyze data of large volume in their higher studies. The fundamentals of these topics are directly useful in understanding engineering applications in various fields.

COMPETENCY:

The course should be taught and implemented with the aim to develop the course outcomes (CO's)for the student to acquire the competency needed to apply the mathematical techniques for engineering subjects.

1. Cognitive: understanding and applying principles of mathematics to engineering problems

2. Psychomotor: To prepare charts displaying the area of irregular shapes using the concept of

integration, prepare charts to displaying grouped and ungrouped data

3. Attitude: discipline, consistency, hard work , to concentrate ,accuracy, punctuality, aesthetics

COURSE OUTCOMES(CO's)

MEF301.1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values

MEF301.2Solve Differential equation of first order and first degree by various methods **MEF301.**3 Calculate Mean Deviation and apply the concept of Coefficient of Variance (C.V.)to compare two sets of data MEF301.4 Solve problems on Probability using addition theorem

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	DCO1	DEO 2
Competency	Basic	Discipli	Experim	Enginee	The	Environ	Ethics	Individu	Commu	Life-	1501	PSO 2
and	knowled	ne	ents and	ring	engineer	ment		al and	nication	long	Work in	Start
COs	ge	knowled	practice	Tools	and	and		team		learning	mfg&	entrepre
		ge			society	sustaina		work:			service	neurial
						binty					sector	activity
Competency:	3	2	-	-	-	-	-	-	-	-	-	
MEF301.1	3	2	-	-	-	-	-	-	-	-	-	
MEF301.2	3	2	-	-	-	-	I	-	-	-	-	
MEF301.3	3	2	-	-	-	-	-	-	-	-	-	
MEF301.4	3	2	-	-	-	-	-	-	-	-	-	

CONTENT : 1)THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)	
MEF301.1 Apply the concept of integration to find the area ,Mean value and Root Mean Square v				
1	Indefinite Integrals	12	20	
	1.1 Definition, Standard formulae			
	1.2 Rules of Integration(without proof),			
	Examples			
	1.3 Integration by substitution,			
	1.4 Integration by parts,			
	1.5 Integration by partial fractions			
MEF301. 1 Ap	ply the concept of integration to find the area, Mean value an	d Root Mean S	quare values	
2	Definite Integrals	06	10	
	2.1 Definition, Examples		-	
	2.2 Properties of Definite Integration (without proof),			
	Examples based on properties			
MEF301.1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values				
3	Application of Integration	06	10	
	3.1 Area under the curve and			
	3.2 Area between two curves			
	3.3 Mean value & R.M.S. value of a function			
	Total	24	40	

MEF301.1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values

1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

2.In each topic, corresponding applications will be explained.

Section II			
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
MEF301.2 Solve	Differential equation of first order and first degree by varie	ous methods	8
4	10	16	
	4.1 Definition of differential equation		
	4.2 Order & degree of Differential equations		
	4.3 Solutions of Differential equations of first order		
	&first degree of following types		
	4.3.1 Variables separable		
	4.3.2 Homogenous Equation		
	4.3.3 Exact equations		
	4.3.4 Linear Equations		
MEF301.3 Calcul	ate Mean Deviation and apply the concept of Coefficien	nt of Varia	nce $(C.V.)$ to
compare two sets of	of data		
5	Statistics - Measures of dispersion	10	16
	5.1 Mean deviation about MEAN		
	5.2 Standard deviation		
	5.3 Standard deviation by Step deviation Method		
	5.4 Coefficient of Variance (C.V.)		
	5.6 Comparison of two sets by finding C.V.		
MEF301.4 Solve	problems on Probability using addition theorem		
6	Probability	04	08
	6.1 Mathematical definition of Probability of any Event		
	6.2 Addition Theorem of Probability		
	6.3 Examples		
	Total	24	40
1.Semester end ex	am question paper should be such that total marks of ques	tions on eac	ch topic is one
and half times the	marks allotted above but the candidates are able to attem	pt question	s of the above
allotted marks only	у.		
2.In each topic cor	responding applications will be explained		

Topic No.	Name of topic	Distribut	ion of marks (l	Course Outcome	Total Marks	
		Remember	Comprehension	Applicatio		
1	Indefinite Integrals	4	6	10	MEF301.1	20
2	Definite Integrals	2	2	6	MEF301.1	10
3	Application of Integration			10	MEF301.1	10
4	Differential equations	2	4	10	MEF301.2	16
5	Statistics	2	4	10	MEF301.3	16
6	Probability	1	4	3	MEF301.4	8

Specification table for setting question paper for semester end theory examination:

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

C) TUTORIALS

Note: Tutorials are to be used to get enough practice [One batch for 20 Students]

Sr No.	Торіс	Tutorial Content (10 problems in each tutorial)
1	Indefinite Integrals	To evaluate Integration using standard formulae, To evaluate Integration using Substitution Method
2	Indefinite Integrals	To evaluate Integration of Various forms.
3	Indefinite Integrals	To evaluate Integration using by Parts rule and Partial fraction method
4	Definite Integrals	To evaluate Define Integration for various forms and using properties.
5	Application of Integration	Apply Integration concepts to find Area ,Mean value, RMS value
6	Differential equations	To determine Order and Degree of D.E Examples on V.S. form, Homogeneous form
7	Differential equations	Examples on Linear of D.E and Exact D.E.
8	Statistics	Examples on Mean Deviation and standard deviation
9	Statistics	Examples on standard deviation by step deviation method and C.V.
10	Probability	Examples on Addition theorem

INSTRUCTIONA STRATEGIES :

Instructional Methods:

- 1. Lectures and Demonstrations
 - 2. Tutorials

Teaching and Learning resources:

1. Chalk board

- 2. Item Bank
- 3.Charts

REFERENCEMATERIAL :

a) Books:

Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	Engineering Mathematics III	PhadakePrakashan, Kolhapur
2.	Patel, Rawal,	Applied Mathematics	NiraliPrakashan,Pune
3.	P.M.Patil and others	Applied Mathematics	Vision Publication, Pune
4.	Sameer Shah	Applied Mathematics	Tech-Max Publication, Pune
5.	P.N.Wartikar	Applied mathematics	Pune vidyarthiGriha Prakashan , pune
6	H.K.Dass	Higher engineering mathematics	S .Chand publication
7	B.S.Grewal	Higher engineering Mathematics	Khanna publication, New Delhi

b) Website

- i) www.khanacademy.org
- ii) www.easycalculation.com
- iii) www.math-magic.com

COURSE ID:

Course Name	: THERMAL ENGINEERING
Course Code	: MEF302
Course Abbreviation	: FTEG

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <nil >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme:

	Progressive A	ssessment	Terr	n End Examina	tion	
Mode of Evaluation	Theory	Practical	Theory Examination	Oral Examination (External)	Term work	Total
Details of Evaluation	Average of two tests of 20 marks each	3.25 marks for each practical4.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-I		
Marks	20		80	25	25	125

RATIONALE:

Thermal engineering is one of the core subjects of Mechanical engineering field which includes study of energy, heat, work and conversion between them. Mechanical engineers need to work with various power producing & power absorbing devices like boilers, turbines, compressors, pumps etc. In order to understand the principles, construction & working of these devices, it is essential to understand thermodynamics.

COMPETENCY

Apply fundamental concepts and laws of thermodynamics to solve engineering problems as follows: **Cognitive :** Apply concepts and laws of thermodynamics to various thermal systems **Psychomotor :** i) Demonstrate thermal equipments ii) Solve problems using steam table and charts **Affective :** Attitude of i) Safety ii) Punctuality iii) Use of Steam table and Charts iv) Analytical thinking

COURSE OUTCOMES :

MEF302-1: Apply fundamental concepts of thermodynamics to various thermodynamic systems

MEF302-2: Interpret various laws of thermodynamics, Ideal gas processes and relative applications

MEF302-3: Describe modes of heat transfer principles

MEF302-4: Calculate properties of two phase system by using steam tables/ mollier charts

MEF302-5: Comprehend the classification, construction, working and performance of boilers

MEF302-6: Understand the use of steam nozzles, turbines, condensers and cooling tower in thermal power plant

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX: [Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

		Programme Outcomes POs and PSOs										
Competenc y and Cos	PO 1 Basic knowle dge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commu nication	PO 10 Life- long learnin g	PSO1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competenc y:	2	3	-	-	-	-	-	-	-	-	-	1
MEF302-1	-	3	-	-	-	-	-	-	-	-	-	-
MEF302-2	2	3	-	-	-	-	-	-	-	-	-	-
MEF302-3	-	3	-	-	-	-	-	-	-	-	-	-
MEF302-4	1	3	1	-	-	-	-	-	-	-	-	1
MEF302-5	1	2	-	-	-	-	-	1	-	-	1	1
MEF302-6	3	2	-	-	-	-	-	-	-	-	1	2

CONTENT: A.THEORY :

SECTION-I

Sr. No.	Topics / Sub-topic	Teaching (Hours)	Theory Evaluation Marks
C	purse OutcomeMEF302-1: Apply fundamental concepts of thermodynamics to ve	arious thermo	odynamic
	systems		
1.	FUNDAMENTAL CONCEPTS OF THERMODYNAMICS		
	1.1 Concept of pure substance, Thermodynamic system, boundary, surrounding	06	10
	1.2 Classification of thermodynamic systems: Open system, Closed		
	system & Isolated system with examples		
	1.3 Properties of system, extensive & intensive properties like specific		
	volume, density, pressure, Temperature, enthalpy, entropy, total		
	volume, Specific enthalpy etc., State of a system, Point function and		
	Path function, thermodynamic process and cycle		
	1.4 Energy: Potential, kinetic and internal energy, Law of conservation of		
	energy, concept of heat and work, similarities and differences		
Ca	purse OutcomeMEF302-2: Interpret various laws of thermodynamics, Ideal gas	processes and	d relative
	applications		
2.	LAWS OF THERMODYNAMICS		
	2.1 Zeroth law of thermodynamics	08	12
	2.2 First law of thermodynamics: statement, limitations, Application to		
	close & open System, Flow work, Steady flow energy		
	equation(SFEE), SFEE applied to engineering systems like boiler,		
	condenser, evaporator, nozzle, turbine, pump & compressor (Simple		
	Numerical)		
	2.3 Second law of thermodynamics:		
	Concept of Perpetual motion machine of first and second kind		
	Kelvin Plank and clausius statement and their equivalence,		
	application of Second law: Heat engine, neat pump and refrigerator		

Sr. No.	Topics / Sub-topic		Theory Evaluation Marks	
C	ourse OutcomeMEF302-2: Interpret various laws of thermodynamics, Ideal gas	processes an	d relative	
	applications		1	
3.	THERMODYNAMIC PROCESSES OF IDEAL GASES			
	 3.1 Ideal gas (perfect gas), Boyle's law, Charle's law, Gay-Lussac's law, Ideal gas equation, Characteristic & universal gas constants, Specific heat at constant pressure & constant volume, ratio of Specific heats 3.2 Ideal gas processes: Isochoric, Isobaric, Isothermal, Adiabatic, Polytropic, Throttling, Representation on P-V and T-S diagrams, Calculation of work done, Heat transfer, Change in internal energy in each process (simple Numerical) 	06	10	
	Course OutcomeMEF302-3: Describe modes of heat transfer principles			
4.	HEAT TRANSFER			
	 4.1 Modes of heat transfer : conduction, convection and radiation 4.2 Fourier's law, Thermal conductivity, Heat transfer through composite wall (Simple Numericals) 4.3 Newton's law of cooling for convection, types of convection 4.4 Absorptivity (α), reflectivity (ρ) and transmissivity (t) and emissivity, Stefan-Boltzman Law, Concept of Black Body, Gray body 4.5 Heat exchangers: Classification and Applications 	04	08	
	TOTAL	24	40	
Ser	nester end exam question paper should be such that total marks of questions on ea	ch topic is o	ne and half	
times	the marks allotted above but the candidates are able to attempt questions of the a	bove allotted	l marks only.	

SECTION-II

Sr. No.	Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks
Сои	arse OutcomeMEF302-4: Calculate properties of two phase system by using steam	n tables/ mo	llier charts
5.	PROPERTIES OF STEAM		
	5.1 Steam as a pure substance, Generation of steam at constant pressure (T-H, H-S and P-H Diagram)	08	12
	5.2 Types of steam: wet, dry, superheated steam		
	5.3 Properties of steam: sensible, latent and total heat, specific volume, dryness fraction		
	5.4 Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure using steam tables and Mollier chart		
	5.5 Vapour Power cycle Introduction: Carnot cycle, Rankine cycle, modified Rankine cycle		
Cour	se OutcomeMEF302-5: Comprehend the classification, construction, working and	d performan	ce of boilers
	STEAM GENERATION		
6.	6.1 Classification of boilers, construction and working of common boilers (Lancashire boiler and Babcock & Wilcox boiler only)	06	10
	6.2 Mountings and Accessories: Function and locations of Mountings and		
	Accessories on boiler		
	6.3 Study of high-pressure boilers like Lamont boiler, Loeffler boiler, Benson boiler and velox boiler		

Sr. No.	Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks
	6.4 Boiler draught: Objectives, classification, relative merits and Demerits		
Cou	rse OutcomeMEF302-6: Understand the use of steam nozzles, turbines, condense	ers and cooli	ng tower in
	thermal power plant		1
	STEAM NOZZLES AND TURBINES		
7.	7.1 Steam Nozzle: Continuity equation, Types of nozzle, concept of Mach	06	10
	No., Nozzle efficiency, applications of nozzle		
	7.2 Steam Turbines: Principles of working, Classification, construction		
	and working of Impulse and Reaction turbine		
	7.3 Compounding of steam turbine: Necessity and methods of compounding		
	7.4 Regenerative feed heating, bleeding of steam		
Cou	rse OutcomeMEF302-6: Understand the use of steam nozzles, turbines, condense	rs and cooli	ng tower in
	thermal power plant		
	CONDENSERS & COOLING TOWERS		
8.	8.1 Objectives, working of Jet & Surface condensers & differences	04	08
	8.2 Elements of steam condensing plant		
	8.3 Dalton's law of partial pressure and its application, concept of condenser efficiency, vacuum efficiency		
	8.4 Sources of air leakage and its effects		
	8.5 Cooling towers and spray ponds: types, construction & Working		
	TOTAL	24	40
Sen	nester end exam question paper should be such that total marks of questions on each	ch topic is or	ne and half
times	the marks allotted above but the candidates are able to attempt questions of the ab	ove allotted	marks only.

Торі	Nome of tonic	Distribu	tion of marks (level-wise)	Course	Total Mark	
No.	Name of topic	Remembe r	Understand	Applica- -tion	Outcome	S
1	Fundamental Concepts of thermodynamics	04	04	02	MEF302-1	10
2	Laws of thermodynamics	04	02	06	MEF302-2	12
3	Thermodynamic processes of Ideal gases	04	02	04	MEF302-2	10
4	Heat Transfer	02	04	02	MEF302-3	08
5	Properties of Steam	04	04	04	MEF302-4	12
6	Steam Generation	04	04	02	MEF302-5	10
7	Steam Nozzles and Turbines	04	04	02	MEF302-6	10
8	Condenser and Cooling Towers	02	02	04	MEF302-6	08
TOT AL		28	26	26		80

Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B.TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr.	Title of Practical Exarcise	Skills / Competencies to be developed	Course
No	The of Fractical Exercise	Skins / Competencies to be developed	Outcome
1	Determination of Thermal	Experimental Performance observation and	MEF302-3
1.	Conductivity of Metal rod	interpretation on the set up	
	Demonstration of construction and	Trace path of flue gasses., water and steam	MEF302-5
	working of fire tube boilers & water	circuit in a boiler, interpret steam tables,	
2	tube boilers with the help of models	Mollier chart and relationship between	
	charts etc.	different thermodynamic properties	
3	Demonstration of construction and	Function, working & use of boiler mountings	
5	working of Boiler mountings with the		
	help of above mentioned training aids		
4	Demonstration of construction and	Function, working & use of boiler accessories	
	working of Boiler accessories		
5	Study of steam Nozzles and turbine	Function, working use of steam Nozzles and	MEF302-6
3		turbine	
6	Study of condenser and cooling towers	Function, working use of condenser, cooling	
6		tower in steam power plant	
	Industrial visit (sugar factory)	Collect information about boiler, accessories,	MEF302-5,
7		mountings, condenser, cooling tower nozzle	MEF302-6
		and turbines used in industry	

C. INDUSTRIAL EXPOSURE :

- a) As per practical no. 5 & 6 expert lectures by prominent personalities from industries.
- **b**) As per practical no. 7 an Industrial visit of students to Sugar Factory.

D. ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION i)Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per following criteria

Sr. No.	Criteria	Marks allotted
1	Quality and neatness of term work	05
2	Attendance	05
3	Participation	05
4	Understanding	05
5	Representation	05
	Total	25

ii)Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted .

iii)Term-end Oral Examination :

Term-end Oral Examination shall be conducted as per the following criteria:

Sr. no	Criteria	Marks allotted
1	Attendance	08
2	Quality and neatness of term work	08
3	Participation	05
4	Result table / calculations / graphs	04
	Total	25

E. INSTRUCTIONAL STRATEGIES :

Instructional Methods:

- 1. Lectures and discussions
- 2. Classroom practices
- 3. Laboratory experiences and laboratory interactive sessions
- 4. Experiences and discussions through industrial visits
- 5. Time bound assignments

Teaching and Learning resources:

- 1. Chalk board
- 2. Demonstrative kits
- 3. Demonstrative charts
- 4. LCD presentations
- 5. Audio presentations
- 6. Item Bank

F.REFERENCE MATERIAL:

a) Books

Sr. No.	Author	Title	Publication
01	Domkundwar V. M.	A Course in Thermal Engineering	Dhanpat Rai & Co.
02	P. L. Ballaney	A Course in Thermal Engineering	Khanna Publishers
03	R. S. Khurmi	A Text book of Thermal Engineering	S. Chand & co. Ltd.
04	R. K. Rajput	A Course in Thermal Engineering	Laxmi Publication, Delhi
05	Patel and Karmchandani	Heat Engine Vol I & II	Acharya Publication
06	P. K. Nag	Engineering Thermodynamics	Tata McGraw Hill
07	B. K. Sarkar	Thermal Engineering	Tata McGraw Hill

b) Websites

- 1) <u>http://chemwiki.ucdavis.edu/Physical_Chemistry/Thermodynamics/Ideal_Gas_Processes</u>
- 2) <u>http://en.wikipedia.org/wiki/Laws_of_thermodynamics</u>
- 3) <u>https://www.boundless.com/chemistry/thermodynamics--2/the-laws-of-thermodynamics/the-three-laws-of-thermodynamics/</u>
- 4) http://www2.estrellamountain.edu/faculty/farabee/biobk/biobookener1.html

* * *

: MACHINE DRAWING
: MEF303
: FMDR

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : CCF108 Engineering Drawing -II

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme:

	Progressive A	ssessment	Term End Ex	amination		
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examinatio n (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	 25 marks for each practical One PST of 25 marks 	Term End Theory Exam (04 hours)	-	As per Proforma-I	
Marks	20		80	25	50	175

RATIONALE:

A Mechanical Engineering Diploma holder, irrespective of his field of operation in an industry, is expected to possess a thorough understanding of drawing, which includes clear spatial visualization of objects and the proficiency in reading and interpreting a wide variety of production drawings. Engineer is also expected to possess certain degree of drafting skills depending upon job function, to perform his day to day activity i.e. communicating and discussing ideas with his supervisors and passing instructions to his subordinates unambiguously. This course envisages reinforcing and enhancing the knowledge and skill acquired in the earlier two courses viz. Engineering Drawing I & II.

COMPETENCY: Prepare production drawing.

Cognitive: Read and Interpret production drawing

Psychomotor: Draw production drawing

Affective: Attitude of i) Analytical Thinking ii) Accuracy ii) Precision iv) Visualization Skill

COURSE OUTCOMES:

MEF303.1- Produce auxiliary view using auxiliary plane.

MEF303.2- Use of conventions for representation of material and mechanical components

MEF303.3- Draw intersection of solids

MEF303.4- Select suitable fit and provide tolerance for machine components

MEF303.5- Prepare detail and assembly drawing.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competency and Cos	PO 1 Basic knowl edge	PO 2 Disci pline kno wled ge	PO 3 Experi ments and practic e	PO 4 Engin eerin g Tools	PO 5 The engine er and societ y	PO 6 Envir onme nt and sustai nabilit y	PO 7 Ethi cs	PO 8 Indivi dual and team work	PO 9 Comm unicati on	PO 10 Life- long learni ng	PSO 1 Work in mfg& servic e sector	PSO 2 Start entrep reneur ial ativity
Competency	1	-	-	-	-	-	-	-	3	3	1	1
MEF303.1	1	-	-	-	-	-	-	-	-	3	1	1
MEF303.2	1	-	-	-	-	-	-	-	-	3	1	1
MEF303.3	1	-	-	-	-	-	-	-	-	3	1	1
MEF303.4	1	-	-	-	-	-	-	-	-	3	1	1
MEF303.5	1	-	-	-	-	-	-	-	-	3	1	1

CONTENT: A.THEORY :

SECTION-I

Sr. No	Sr. No Topics / Sub-topic		Theory Evalua tion Mar ks
Cour	rse OutcomeMEF303-1: Produce auxiliary view using auxiliary plane sys	stems	
	AUXILIARY VIEWS		
1.	1.1 Study of auxiliary planes,	06	08
	1.2 Projection of objects on auxiliary planes,		
	Completing the regular views with the help of given auxiliary		
	views (Use first angle method of projection)		
Cour	rse OutcomeMEF303-2: Use of conventions for representation of materia	l and mech	anical
comp	ponents		
	CONVENTIONAL REPRESENTATION		
2.	2.1 Standard conventions using $SP - 46$ (1988)	04	08
	(a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood,		
	Glass, Concrete and Rubber		
	(b) Long and short break in pipe, rod and shaft.		
	(c) Ball and Roller bearing, pipe joints, cocks, valves, internal /		
	external threads		
	(d) Various sections- Half, removed, revolved, offset, partial		
	and aligned sections		
	(e) Knurling, serrated shafts, splined shafts and chain wheels.		
	(f) Springs with square and flat ends, Gears, sprocket wheel		
	(g) Countersunk & counter bore		

Sr. No	Topics / Sub-topic	Teaching (Hours)	Theory Evalua tion Mar ks
	(h) Tapers		
Cou	rse OutcomeMEF303-4: select suitable fit and provide tolerance for mach	hine compon	ents
3.	 ELEMENTS OF PRODUCTION DRAWING 3.1 Characteristics of surface roughness: Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods 3.2 Introduction to ISO system of tolerance, dimensional tolerances, elements of interchangeable system, hole & shaft basis system, limits, fits & allowances. Selection of fit (Simple Numerical) 3.3 Geometrical tolerances, tolerances of form, position & its Representation 3.4 General welding symbols, sectional representation and symbols used in Engineering practices 	06	12
Cour	rse Outcome MEF MEF303-3: Draw intersection of solids		
4.	 INTERSECTION OF SOLIDS 4.1 Curves of intersection of the surfaces of the solids in the following cases; (a) Prism with prism, Cylinder with cylinder, Prism with Cylinder; when (i) the axes are at 90° and intersecting (ii) The axes are at 90° and Offset (b) Cylinder with Cone When axis of cylinder is parallel to both the reference planes and cone resting on base on HP and with axis intersecting and offset from axis of cylinder 	08	12
	TOTAL	24	40
Semone a abov	ester end exam question paper should be such that total marks of questions and half times the marks allotted above but the candidates are able to atten re allotted marks only.	s on each top npt question	oic is s of the

Sr. No	Topics/Sub-topic	Teachin g (Hours)	Theory Evalua tion Marks
Cour	rse OutcomeMEF303-5: Prepare detail and assembly drawing		
	DETAILS TO ASSEMBLY	12	20
	5.1 Introduction		
	5.2 Preparation of the assembly drawing from the given detailed		
	drawing of various machine components or parts		
	a) Couplings – Universal couplings & Oldham's Coupling,		
	b) Bearing – Foot Step Bearing & Pedestal Bearing		

|--|

Sr. No	Topics/Sub-topic	Teachin g (Hours)	Theory Evalua tion Marks
	c) Lathe tool Post		
	d) Machine vice & Pipe Vice		
	e) Screw Jack		
	f) Steam Stop Valve		
Cour	rse OutcomeMEF303-5: Prepare detail and assembly drawing		
	ASSEMBLY TO DETAILS	12	20
	6.1 Introduction		
	6.2 Preparation of detailed working drawing from the given		
	assembly drawing of machine component or part		
	a) Pedestal Bearing		
	b) Lathe Tail Stock		
	c) Drilling Jig		
	d) Piston & connecting rod		
	e) Gland and Stuffing box Assembly		
	f) Valve – Not more than eight parts		
	g) Fast & loose pulley		
	TOTAL	24	40
Sem	ester end exam question paper should be such that total marks of questions	on each to	pic is
one a	and half times the marks allotted above but the candidates are able to attem	pt question	s of the

above allotted marks only.

Specification table for setting question paper for semester end theory examination :

To	Nome of tonic	Distribution of marks (Cognitive level-wise)			Course	Tota l
pic No.	Name of topic	Remem ber	Understa nd	Applica- -tion	Outcome	Mar ks
1	Auxiliary Views	04	02	02	MEF303-1	08
2	Conventional Representation	03	02	03	MEF303-2	08
3	Elements of Production Drawing	04	02	06	MEF303-4	12
4	Intersection of solids	04	02	06	MEF303-3	12
5	Details to Assembly	06	06	08	MEF303-5	20
6	Assembly to Details	06	06	08	MEF303- 5	20
	Total	27	20	33		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B.TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr N o	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Auxiliary views One sheet containing two problems and at least two problems as home assignment in sketch book.	To Draw auxiliary view on given auxiliary plane.	MEF303-1
2.	Conventional Representation as per SP – 46 (1988) - one sheet.	Use of standard conventions & representation	MEF303-2
3.	Limit, Fit, Tolerances and Machining Symbols - one sheet.	Selection of suitable limits, fits, tolerances and machining symbols	MEF303-4
4.	Study of production drawings of any two simple components and its preparation – one sheet	Understand the use of elements of production drawing for actual part manufacturing	
5.	Intersection of Solids One sheet containing at least two problems (At least four problems for home assignment in sketch book)	Draw curves of intersection of two solids	MEF303-3
6.	Details to Assembly: Preparation of assembly drawing of any one component from its detailed drawing covering surface roughness symbols, limits, fits, tolerances and part list – One sheet (at least two problems as home assignment in sketch book)	Prepare assembly drawing from given detailed drawing	MEF303-5
7.	Assembly to Details: Preparation of detailed drawing from the given assembly drawing of any one part covering all the elements of production drawing – One sheet (at least two problems as home assignment in sketch book)	Prepare part drawing from given assembly drawing	MEF303-5
8.	One simple problem on assembly and detailed drawing using any CAD Package (Assembly containing maximum 6 to 7 components- minimum)	Prepare assembly and detailed drawing of simple component using CAD software	MEF303-5

C. INDUSTRIAL EXPOSURE:

Included in practical no. 3 & 4 and expert lectures by prominent personalities from industry.

D. ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION a)Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given below:

Sr. No.	Criteria	Marks Allotted
1.	Attendance	05
1.	Preparedness for practical	05
3.	Correctness and Understanding	10
4.	Line work and neatness	05
	Total	25

b) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in proforma-I

c) Term-end Oral Examination :

Term-end oral Examination shall be conducted as per the following criteria:

Sr. No.	Criteria	Marks allotted
1	Understanding of the subject	15
2	Quality of term-work	15
3	Dimensioning and judgment without measurement	10
4	Proper use of drawing instruments	10
	Total	50

Final Assessment of Oral Examination shall be done as per Pro-forma-I.

E. INSTRUCTIONAL STRATEGIES:

Instructional Methods:

- 1. Lectures and discussions
- 2. Classroom practices
- 3. Laboratory experiences and laboratory interactive sessions
- 4. Experiences and discussions through industrial visits
- 5. Time bound assignments

Teaching and Learning resources:

- 1. Chalk board
- 2. Demonstrative kits
- 3. Demonstrative charts
- 4. LCD presentations
- 5. Audio presentations
- 6. Item Bank

F. REFERENCE MATERIAL :

a) Books

Sr. No.	Author	Title	Publication
01	N.D.Bhatt	Machine Drawing	Charotar Publication, Anand
02	IS Code SP 46 (1988)	Code of practice for general engineering drawing.	Engineering Drawing Practice for School and colleges

03	L.K.Narayanan,	Production Drawing	New Age International
	P.Kannaich,		Publication
	K.VenkatReddy		
04	P.S.Gill	Machine Drawing	S.K.Kataria and Sons
05	M.L.Dabhade	Engineering Graphics (For	
		Topic on Auxiliary Views)	
06	Sidheshwar	Machine Drawing	Tata McGraw Hill

b) Websites

- a) http://draftingmanuals.tpub.com/14040/css/14040_49.htm
- b) http://www.roymech.co.uk/Useful_Tables/Drawing/Mech_Drawings.html
- c) http://www.me.metu.edu.tr/courses/me114/Lectures/assembly.htm#1
- d) http://www.fkm.utm.my/~arahim/Assembly%20Drawing.pdf

* * *

COURSE ID:

Course Name	: MANUFACTURING PROCESSES
Course Code	: MEF304
Course Abbreviation	: FMPR

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s)	: <nil></nil>	
Teaching Scheme :		
Scheme component	Hours / week	Credits
Theory	03	07
Practical	04	07

Evaluation Scheme :

Madaaf	Progressiv	ve Assessment	Tei			
Niode of	Theory	Dreation	Theory	Practical	Torm Work	Total
Evaluation	Theory	Practical	Examination	Exam	Term work	
Details of Evaluation	Average of two tests of 20 marks each	1.25 marks for each practical2.One PST of 25 marks	Term End Theory Exam (03 hours)		As per Proforma-III	
Marks	20		80	50	25	175

RATIONALE :

Manufacturing processes is a basic technology course for mechanical engineering. It enhances the skills which the students have acquired in workshop practice and basic workshop practice. Manufacturing is the basic area for Diploma Engineers. He/ She should be introduced to the basic processes of manufacturing. The course will help the students to get familiarized with working principles and operations like Pattern making, Molding, Casting, Fabrication, press work etc.

The basic knowledge of these processes will be helpful to select most suitable processes for conversion of raw material into finished product as per the requirement.

COMPETENCY :

Select appropriate manufacturing processes for converting raw material into finished product.

Cognitive :Understand various manufacturing processes.

Psychomotor : Prepare wooden pattern, fabricate component and develop skill of moldings practice **Affective :**Develop **a**ttitude of i) Accuracy ii) Safety

COURSE OUTCOMES :

MEF304-1 Select basic manufacturing processes.

MEF304-2 Prepare a wooden pattern.

MEF304-3 Perform molding practice.

MEF304-4 Apply principles of various manufacturing processes.

MEF304-5 Use of welding process to fabricate a simple job.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

Programme Outcomes POs and PSOs												
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competency:	1	-	3	-	-	-	-	-	-	-	2	-
MEF304-1	1	-	3	-	-	-	-	-	-	-	2	-
MEF304-2	1	-	3	-	-	-	-	-	-	-	2	-
MEF304-3	1	-	3	-	-	-	-	-	-	-	2	-
MEF304-4	1	-	3	-	-	-	-	-	-	-	2	-
MEF304-5	1	-	3	-	-	-	-	-	-	-	2	-

CONTENT :

A) THEORY :Section I

Sr. No.	Topics / Sub-topics		Theory Evaluation (Marks)		
Course Outc	ome MEF304- Select basic manufacturing processes.		L		
MEF304-4 A	pply principles of various manufacturing processes.				
1	PATTERN MAKING	07	10		
	1.1 Pattern making materials (wood, plastics, rubbers,				
	plasters, waxes, metallic pattern)				
	1.2 Types of patterns:				
	Single piece pattern, Split pattern, Match plate pattern,				
	Sweep pattern, Skeleton pattern				
	1.3 Pattern making allowances: Shrinkage, draft,				
	machining, distortion, rapping				
	1.4 Color coding for patterns and core boxes.				
Course Outc	ome – MEF304-1 Select basic manufacturing processes.				
MEF304-4	Apply principles of various manufacturing processes.				
2.	MOULDING	07	14		
	2.1 Molding sand : Green, Dry, Loam, Facing, baking,				
	System, parting, Core sand				
	2.2 Properties of Molding sand				
	2.3 Core prints :Horizontal, vertical, hanging, balancing,				
	wing				
	2.4 Molding processes:				
Green sand, Dry sand, Machine and Shell Molding					
Course Outc	ome – MEF304-1 Select basic manufacturing processes.				
	MEF304-4 Apply principles of various manufacturing	processes.			
3	CASTING	10	16		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outc	ome MEF304- Select basic manufacturing processes.		
MEF304-4 A	pply principles of various manufacturing processes.		
	3.1Casting Principle		
	3.2 Die casting methods: Hot chamber die casting method,		
	Cold chamber die casting method		
	3.3Melting furnace for ferrous and non ferrous metals:		
	Cupola furnace: Construction and operation, zones,		
	capacity, Temperature range, Induction furnace.		
	3.4Defects in casting: Causes and remedies		

	Section II		
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Ou	<i>tcome</i> – MEF304-1 Select basic manufacturing processes.		
	MEF304-4 Apply principles of various manufacturing principles of v	rocesses	
4	FABRICATION	08	14
	4.1Classification.		
	4.2Arc welding :Principle, Applications, Shielded metal		
	arc welding, Sub-merged arc welding		
	4.3Resistance welding: Spot, Projection, Seam,		
	Percussion.		
	4.4Gas welding techniques, Types of flames, Welding		
	defects.		
	4.5Soldering and Brazing: Types, Principle and		
	Applications		
Course Ou	<i>tcome</i> – MEF304-1 Select basic manufacturing processes.		
	MEF304-4 Apply principles of various manufacturing p	processes.	
5	PRESS WORKING	06	08
	5.1 Types of presses and Specifications		
	5.2 Press working operations :Cutting, bending, drawing,		
	punching, blanking, notching, lancing		
	5.3 Die set components: Punch and die shoe, guide pin,		
	Bolster plate, Stripper, stock guide, feed stock, pilot		
Course Ou	<i>tcome</i> – MEF304-1 Select basic manufacturing processes.	1	
	MEF304-4 Apply principles of various manufacturing pr	ocesses	
6	Forming Processes :	10	18
	6.1 Forging Processes: Drop forging, Upset forging,		
	Press forging.		
	6.2 Types of Dies: Open die, closed die		
	6.3 Forging Operations: Fullering, Edging, Bending,		
	Blocking		
	6.4 Forgeable materials and Forgeability:		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
	Forging temperature, Grain flow in forged parts				
	6.5 Principles of rolling and extrusion				
	6.6 Hot and cold rolling				
	6.7 Types of rolling mills				
	6.8 Different sections of rolled parts.				
	6.9 Methods of extrusion: Direct, Indirect, Backward &				
	Impact Extrusion				
	6.10 Advantages, disadvantages and applications				
	Total	48	80		
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the					
marks allotted	above but the candidates are able to attempt questions of the above allotted	l marks only.			

Specification table for setting question paper for semester end theory examination :

Торі		Distribution	of marks (Cognit	tive level-wise)	Course	Total
c No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Marks
1	Pattern making	02	04	04	MEE304-1 & 4	10
2	Molding	02	06	06	MEE304-1 & 4	14
3	Casting	04	06	06	MEE304-1 & 4	16
4	Fabrication	04	04	06	MEE304-1 & 4	14
5	Press working	02	02	04	MEE304-1 & 4	08
6	Forming	02	06	10	MEE304-1 & 4	18
	TOTAL	16	28	36		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

TERM WORK

Practical Exercises and related skills to be developed :

Sr.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
	One simple wooden Pattern job of maximum	To develop the skill of manufacturing	MEF304-2
1	4 students per group, each group should	patterns and their allowances	
	make different type of pattern.		
	Demonstration of molding practice and prepare	To understand and to identify different	MEF304-3
2	simple mould using wooden pattern	molding methods	
		To fabricate component by using	MEF304-5
3	One composite welding job having two	welding	

		technique.	
	different joints. (Batch of four students per		
	job.)		
4	Industrial Visit / Demonstration - TIG / MIG welding setup and write report	To know and observe TIG / MIG welding	MEF304-1&4
5	Assignment on forming processes.	To know forging die nomenclature	MEF304-1&4

B) INDUSTRIAL EXPOSURE :

Sr. No.	Mode of Exposure	Торіс
1.	Field visits	Covering theory
2.	Field examples of course application	Term-work assignment

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

g) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cogintive	Application	05
Developmentor	Operating Skills	10
rsycholiotol	Drawing / drafting skills	10
Affactivo	Discipline and punctuality	10
Allective	Decency and presentation	10
	50	

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted as per criteria. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES : Instructional Methods :

- 1. Lectures
- 2. Demonstration during practicals

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- **Reference Books :-**

Author	Title	Publisher
S. K. Hajra Chaudhary,	Elements of workshop Technology -	Media Promoters and
Bose, Roy	Volume I & II	Publishers limited
B.S. Raghuvanshi	Elements of workshop Technology –	Dhanpat rai & Sons
	Volume I & II	
R. K. Jain	Production Technology	Khanna Publication New
		Delhi
Production Technology	Hindustan Machine Tools (HMT)	Tata Publication

b) Websites

1)<u>http://nptel.ac.in</u>

2)www.egr.msu.edu/~pkwon/me478

3)<u>www.basicmechanicalengineering.com/lathe~machine~operation~basic:turning.operations</u> 4)<u>www.planomillers.com/drilling.machine.html</u> 5)<u>www.jsw.co.in/en/products/injectionmoulding</u>

6)http://www.opm.gov/fedclass/fws3869.pdf

* * *

COURSE ID:

Course Name	: THEORY OF ENGINEERING DESIGN.
Course Code	: MEF 305
Course Abbreviation	: FTED

TEACHING AND EVALUATION SCHEME : Pre-requisite Course(s) : CCF110 Applied Mechanics

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme :

Mode of	Progressiv	ve Assessment	Theory	E W 1	Total	
Evaluation	Theory	Practical	Examination	Term Work		
Details of Evaluation	Average of two tests of 20 marks each	I.25 marks for each practical II. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III		
Marks	20		80	25	125	

RATIONALE :

This course is a continuation of Applied Mechanics. It deals with mechanics of deformable bodies. Effects of various force systems on various machine components can be studied and deformations and stresses can be determined using the principles . Mechanical properties of engineering materials are also studied in this course.

It lays a foundation for the course Machine Design.

.COMPETENCY :

Apply principles of theory of engineering design to solve engineering problems.

Cognitive : Understanding and applying principles of theory of engineering design to engineering problems **Psychomotor :** i) Operating testing machines ii) plotting graphs and diagrams.

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

COURSE OUTCOMES :

MEF305-1Anlysis of basic mechanical actions and behavior of materials under the action of forces.

MEF305-2Draw shear force and bending moment diagrams of beams.

MEF305-3 Determine moment of inertia of sections.

MEF305-4Determine stresses in members according to the action of loading.

MEF305-5 Determine principle stresses in structural components.

MEF305-6 Determine torsional stresses for circular sections.

OMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

					Pro	ogramme	Outco	mes PO	s and <mark>F</mark>	PSOs				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2	PSO3	PSO 4
Competency	Basic	Discipl	Experime	Enginee	The	Environme	Ethics	Individua	Commu	Life-		1502	1500	1001
and	knowledge	ine	nts and	ring	engineer	nt and		l and	nication	long	Work in	Acquain	Purse	Start
COs		knowle	practice	Tools	and	sustainabili		team		learning	mfg&	ted with	higher	entreprene
		dge	_		society	tv		work:		_	service	curret	education	urial
		Ũ			· ·	· ·					sector	technolo		activity
												gy		
Competency	3	-	2	-	-	-	-	2	-	2	-	-		-
MEF305-1	3	-	2	-	-	-	-	2	-	2	-	-	1	-
MEF305-2	3	-	-	-	-	-	-	-	-	2	-	-	1	-
MEF305-3	3	-	-	-	-	-	-	-	-	2	-	-	1	-
MEF305-4	3	-	-	-	-	-	-	-	-	2	-	-	1	-
MEF305-5	3	-	2	-	-	-	-	-	-	2	-	-	1	-
MEF305-6	3	-	2	-	-	-	-	2	-	2	-	-	1	-

CONTENT : A) THEORY

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluatio n (Marks)
Cour	se Outcome :MEF305-I Anlysis of basic mechanical actions and behavior of materials under the	he action of	forces.
1	Axial Tension and Compression		
	1.1 Basic mechanical actions : axial tension, axial compression, flexure, shear, torsion.	08	12
	Combination of basic mechanical actions.		
	1.2 Behavior of ductile and brittle material under tension.		
	1.3 Definition of axial and eccentric loading. Definition of uni-axial, bi-axial and tri-axial		
	loading. Diagrams showing these loadings.		
	1.4 Examples of components in axial tension and compression.		
	1.5 Numerical problems on deformations of uni-axial members made up of i) single material		
	ii) combination of two or more materials along the length (compound members).		
	Practical examples.		
	1.6 Composite sections : Stresses and elongation under uni-axial loading. Modular ratio.		
	1.7 Lateral strains and deformation. Poisson's ratio.		
	1.8 Volumetric stress and strain, bulk modulus.		
	1.9 Shear stresses and shear strains. Modulus of rigidity.		
	1.10 Relation among elastic constants.		
	1.11 Temperature stresses in simple member.		
2	Strain Energy		
	2.1Definition of strain energy, resilience, proof resilience and modulus of resilience. Strain	04	08
	energy stored due to gradual, sudden and impact loading		
	2.2 Stresses and elongation due to gradual, sudden and impact loading		
Cours	Se Outcome : MEF305-2 Draw shear force and bending moment diagrams of beams.		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluatio n (Marks)
3	Shear Forces and Bending Moments in Beams		
	3.1 Types of beams : simply supported, over-hanging, cantilever, propped cantilever, fixed,	08	12
	continuous. Types of loads : concentrated loads, uniformly distributed loads and uniformly		
	varying loads, couple loads		
	3.2 Definition of shear force and bending moment at a section, Sign convention. Relation		
	between shear force and bending moment		
	3.3 problems on Shear force diagrams and bending moment diagrams for cantilever, simply		
	supported and overhanging beams subjected to above loads. Point of contraflexure.		
Cours	se Outcome: MEF 305-3 Determine moment of inertia of sections.		
	Moment of Inertia		
	4.1Definition of moment of inertia. Moment of inertia of regular plane figures square	04	08
4	rectangle triangle circle		
-	4.2Parallel axes theorem and perpendicular axes theorem		
	4.3Moment of Inertia of composite figures. Radius of gyration		
	Total	24	40
Semes	ter end exam question paper should be such that total marks of questions on each topic is one and half	times the ma	arks allotted
above	but the candidates are able to attempt questions of the above allotted marks only		

Section II

Sr. No.	Topics	Teaching Hours	Theor y Evalu ation
Cour	se Outcome : MEF305-4 Determine stresses in members according to the action of loading.		
5	Direct and Bending Stresses		
	 5.1Flexural behavior of beams: Definition and assumptions in theory of simple bending. Tension and compression zones, neutral axis, bending stresses, stress distribution over the section, moment of resistance, section modulus. Flexural formula and its application (no derivation) 5.2Concept of direct and eccentric loading. Practical examples. 5.3Stresses in machine components subjected to eccentric loads with eccentricity about only one axis. Core of section 	08	12
6	Shear Stresses in Beams.		
	6.1 Assumptions and shear stress formula. (no derivation)		
	e.g. rectangular, circular, I section, T section.	04	08
	6.3 Relation between maximum and average shear stress.		
Cours	e Outcome :MEF305-5 Determine principal stresses and planes in structural components.		

7	Principal Stresses and Principal Planes.		
	7.1Definition of principal stresses and principal planes. Different states of stresses.	04	08
	Diagrammatic representation.		
	7.2Analytical method : Determination of normal and shear stresses on oblique planes of an		
	element subjected to axial stresses and / or shear stresses. Resultant stress and its obliquity.		
	Determination of principal planes, principal stresses, maximum shear stresses and their		
	planes. Planes of maximum obliquity.		
	7.3Graphical method : Mohr's circle method to determine the above stresses and planes.		
Cour	se Outcome : MEF305-6Determine torsional stresses for circular sections.		
8	Torsion in Shafts.		
	8.1Assumptions in theory of torsion. Definition of torsional load, twisting moment, angle of		
	twist. Torsional equation, snear stress distribution across a section of solid and nonow circular		
	snan. 9.2 Terrieral danach of bellers and selid shefter. Contastin maisht das to bellers shefte	08	12
	8.2 I orsional strength of hollow and solid shafts. Saving in weight due to hollow shafts.		
	Power transmitted by shafts.		
	8.3 Combined torsion and bending		
	Total	24	40
Semes	ster end exam question paper should be such that total marks of questions on each topic is one	e and half ti	mes the
marks	allotted above but the candidates are able to attempt questions of the above allotted marks only.		

Specification table for setting question paper for semester end theory examination :

Topic		Distribution	of Marks (Cognitiv	ve level wise)	Course	Total
no.	Name of topic	Remember	Understand	Apply	Outcome	Marks
1	Axial Tension and Axial Compression . 02 02 08					12
2	Strain energy.	02	02	04	MEF305-1	08
3	Shear Forces and Bending Moments in Beams.	02	02	08	MEF305-2	12
4	Moment of Inertia.	02	02	04	MEF305-3	08
5	Direct & bending Stresses in Beams.	02	02	08	MEF305-4	12
6	Shear stresses in beam.	02	02	04	MEF305-4	08
7	Principal stresses and strains	02	02	04	MEF305-5	12
8	Torsion in shaft.	02	02	08	MEF305-6	08
	Total	16	16	48		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above. Candidates can attempt questions of the above allotted marks only.

B) TERM WORK : Term work shall consist of the following :

a)Laboratory Experiments. (any eight)

(Laboratory Manual on *theory of engineering design* developed by the Institute shall be used)

Sr.	Laboratory experiments (Any eight)	Competencies to be developed	Course Outcome
1	Demonstration of universal testing machine.	Identify different parts of machine and their actions.	
2	Tension test on mild steel bar.	Determine mechanical properties of mild steel.	
3	Tension test on HYSD steel bar.	Determine mechanical properties of HYSD steel.	WIL1 505-1
4	Compression test on metals.	Interpret failure patteren (behavior)of metal under compression action	

5	Izod Impact test on metals.	Discriminate various materials on the basis of strain energy absorbed.	
6	Charpy Impact test on metals.	Discriminate various materials on the basis of strain energy absorbed.	
7	Deflection and Flexural test on mild steel	Determine deflection of material under loading.	MEF305-4
8	Shear test on metals	Discriminate failure under single and double shear action.	
9	Brinell Hardness test on metals	Interpret BHN of different metals	MEF305-1
10	Rockwell hardness test on metal	Interpret RHN of different metals.	
11	Torsion test on mild steel	Determine torsional strength of steel.	MEF305-6

b)Exercises:

1	Shear force and bending moment diagrams - 4 problems	Determine SFD & BMD of the beam	MEF305-2
2	Mohr's circle -4 problems	Determine principal stresses using analytical and graphical method	MEF305-5
3	Identification of forces/moments/loads	Identify actions of forces	MEF305-1

c) Micro Projects :

1	Identification of actions of forces on machine : Students shall present report in the group of 3/5 on a machine as guided in Laboratory Manual on <i>theory</i> <i>of engineering design</i> developed by the Institute.	Identify actions of forces.	MEF305-1
2	Software based exercises Students shall carry out software based exercises as guided in the <i>Laboratory</i> <i>Manual on theory of engineering design</i> developed by the Institute on : study of variation of parameters of phenomena.	Integrate the knowledge & apply this to complex problems.	MEF305-1 MEF305-2 MEF305-3 MEF305-4 MEF305-5 MEF305-6

C. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс	
1.	Field examples of course application	Topics of theory syllabus	
2.	Field examples of course application	Term-work assignment on survey of Equipments or machines	

ASSESSMENT CRITERIA FOR TERM WORK :

a) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given in *Laboratory Manual for* theory of engineering design

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Laboratory Manual for* theory of engineering design

Final marks of term work shall be awarded as per Assessment Pro-forma III.

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

1. Lectures cum Demonstrations

2. Tutorial exercise

Teaching and Learning resources :

- 1. Chalk board
- 2. Use of charts
- 3. Audio visual presentations
- 4. Item Bank

REFERENCE MATERIAL : a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Timoshenko, S.P. and Young, D.H.	Elements of Strength of Materials	Affiliated East West Press Pvt. Ltd., Delhi
2.	SunilDeo	Text book on Mechanics of Structures	Nirali Publications
3.	Bhavikatti, S.S.	Strength of materials.	Vikas publishing house
			pvt Ltd.
4.	Khurmi, R.S.	Strength of Materials	S.Chand & Co., Delhi
5.	Singer, F.L.	Strength of Materials	Harpe Collins Publishers India Delhi
6	S Ramamurtham & Narayan	Strength of materials	Danpat Rai
7	S.S Ratan	Strength of materials	Tata McGraw-Hill

b) Websites

- i. en.wikipedia.org/wiki/Structural_mechanics
- **ii.** http://www.powershow.com/view/15b5baNzRmY/CE_203Structural_Mechanics_powerpoint_ppt_pre sentation

* * *

COURSE ID:

Course Name	: MACHINE TOOLS
Course Code	: MEF306
Course Abbreviation	: FMTL

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <nil >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	00

Evaluation Scheme :

Mode of	Progressiv	ve Assessment	Term 1			
Evaluation	Theory	Practical	Theory Examination	Term Work	Practica 1 Exam	Total
Details of Evaluation	Average of two tests of 20 marks each	Average of wo tests of 20 narks each1)25 marks for each practical 2)000 <td< th=""><th>As per Proforma-III</th><th></th><th></th></td<>		As per Proforma-III		
Marks	20		80	25	50	175

RATIONALE :

Diploma technician often comes across various types of basic production processes. He / She required to select operate and control processes. He / She also required knowing about various cutting tools, latest improvements in production processes, surface finishing process and plastic processes.

COMPETENCY :

Operate various machine tools.

Cognitive :Understand the theory of metal cutting and mechanisms of various machine tools. **Psychomotor :** Perform operations on different machine tools. **Affective :**Develop **a**ttitude of i) Accuracy ii) Safety iii) Precision

COURSE OUTCOMES :

MEF306-1 Select cutting tools materials and trace various mechanisms of machine tools.

MEF306-2 Specify Lathe machine , Drilling machine , Shaping machine, Broaching and Grinding machine.

MEF306-3 Perform various operations on above machine tools.

MEF306-4 Select various super finishing processes.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes Pos and PSOs											
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competency:	1	-	3	-	-	-	-	-	-	-	2	-
MEF306-1	1	-	3	-	-	-	-	-	-	-	2	-
MEF306-2	1	-	3	-	-	-	-	-	-	-	2	-
MEF306-3	1	-	3	-	-	-	-	-	-	-	2	-
MEF306-4	1	-	3	-	-	-	-	-	-	-	2	-

CONTENT :

C) THEORY:

	Section I		
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course (Dutcome : MEF306-1 Select cutting tools materials and trace vario	us mechanis	sms of machine
tools.			
1	Theory of Metal Cutting	06	12
	1.1 Basic concepts of machining, cutting tool		
	1.2 Cutting tool materials & its properties		
	1.3 Single point cutting tool & its geometry		
	1.4 Tool signature		
	1.5 Tool angles		
	1.6 Cutting fluids or coolants : Types, purpose and		
	desirable characteristics		
	1.7 Formation of chips : Continuous, discontinuous,		
	built up edge		
	1.8 Chip breakers		
	1.9 Cutting tool parameters		
Course (Dutcome :		
MEF306	-1 Select cutting tools materials and trace various mechanisms of mach	ine tools.	
MEF306	5-2 Specify Lathe M/c, Drilling M/c, Shaping machine, Broaching Mac	chine and	
	Grinding Machine.		
2.	Lathe Machine	04	14
	2.1 Types of Lathes : Light duty, Medium duty and		
	Heavy duty geared lathe, CNC lathe		
	2.2 Specifications		
	2.3 Basic parts and their functions		

Sr. No.	Topics / Sub-topics		Theory Evaluation (Marks)				
Course (Dutcome : MEF306-1 Select cutting tools materials and trace vario	us mechanis	sms of machine				
tools.							
	2.4 Operations – Turning, Parting off, Knurling,						
	Facing, Boring, Drilling, threading, Step turning,						
	Taper turning						
	2.5 Cutting parameters						
	2.6 Cutting speed, feed, depth of cut and machining						
	Time						
Course (Dutcome :						
MEF306	-1 Select cutting tools materials and trace various mechanisms of mac	chine tools.					
MEF306	-2 Perform various operations on above machine tools.						
3	Drilling Machines	06	14				
	3.1 Classification						
	3.2 Radial drilling machine						
	3.3 Specifications						
	3.4 Operations : Drilling, Boring, Counter Boring,						
	Countersinking, Reaming, Spot facing, Tapping,						
	Lapping, Grinding, Trepanning.						
	3.5 Twist drill nomenclature						
	3.6 Types of drills						
	3.7 Cutting Parameters						
	3.8 Cutting speed, feed, depth of cut and machining						
	Time						
	Total	16	40				

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)			
Course (Dutcome :					
MEF306	5-1 Select cutting tools materials and trace various mechanisms of machi	ne tools.				
MEF306	MEF306-2 Specify Lathe M/c, Drilling M/c, Shaping machine, Grinding machine & Broaching					
	Machine					
5	Broaching Machines :		08			
	5.1 Introduction					
	5.2 Classification of broaching machine					
	5.3 Basic parts of vertical broaching machine &					
	their functions					
	5.4 Broaching methods & operations					

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)	
	5.5 Advantages & limitations of broaching machines			
Course (MEF30 MEF30	 Dutcome : 5-1 Select cutting tools materials and trace various mechanisms of mach 5-2 Specify Lathe M/c, Drilling M/c, Shaping machine, Grinding mach Machine. 	hine tools. ine & Broach	ing	
6	Grinding		12	
	 6.1 Classification of Grinding machines 6.2 Grinding wheel types and shapes 6.3 Tool & cutter grinder 6.4 Designation of grinding wheel as per 551-1954 6.5 Types of abrasive 6.6 Grit, Grade & Structure of grinding wheel 			
Course (Dutcome :			
MEF30	5-4Select various super finishing processes.			
7	Super Finishing Processes :	04	10	
	7.1 Introduction			
	7.2 Methods of surface finishing, advantages, limitations &			
	applications of following processes			
	7.3 Honing Process			
	7.4 Lapping Process			
	7.5 Burnishing Process			
	7.0 Poinsing and builing process	16	40	
Semester e	nd exam question paper should be such that total marks of questions on each topic is o	ne and half times	the marks allotted	

Specification table for setting question paper for semester end theory examination :

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course	Total
		Remember	Understand	Applica- -tion	Outcome	Marks
	Theory of Metal					
1	Cutting	04	04	04	MEF306 - 1	12
2	Lathe Machines	04	05	05	MEF306 - 1-3	14
3	Drilling Machines	04	04	06	MEF306 - 1-3	14
	Shaping, Planning &					
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4	Slotting Machines	04	04	02	MEF306 - 1-3	10
5	Broaching machines	02	02	04	MEF306 - 1-3	08
6	Grinding Machines	02	04	06	MEF306 - 1-3	12
7	Superfinishing	02	04	04	MEF306 - 4	10
TOTAL		22	27	31		80

TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	One job on lathe containing the operations like plain turning, threading, boring, taper turning.	To select speed, feed and tool for various operations like turning, boring, threading etc.	MEF306 - 1-4
2	One job on Shaping/Slotting Machine	To know Shaping/Slotting methods	MEF306 - 1-4
3	One pattern making composite job of Thermocole material	To develop the skill of pattern making	MEF306 - 3
4	One assignment on accessories & attachment – chucks, mandrels, carrier and catch plates rests, face plate and angle plate, grinding attachment used on lathe.	To know about various basic parts of lathe machine and various attachments.	MEF306 - 3
5	One assignment on types of grinding wheels.	To know about various grinding wheels and shapes.	MEF306 - 3
6	Demonstration of center less grinding machine & report writing/ One job on grinding machine.	To develop advance grinding methods.	MEF306 - 3
7	One assignment on cutting tool nomenclature and tool signature of single point cutting tool.	To know theory of metal cutting of single point cutting tools geometry andnomenclature.	MEF306 - 3
8	One assignment on accessories & attachment, work holding & tool holding devices used on milling machine.	To maintain maintenance of machine tools like milling machine.	MEF306 - 1-4
9	One assignment on shapers, planers and slotting machines.	To know the working principle of shapers, planers and slotting machines.	MEF306 - 1-4
10	Assignment on accessories and attachments used on lathe.	To know various parts and attachments of lathe.	MEF306 - 1-4

D) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field visit	Covering theory
2.	Field examples of course application	Term-work assignment

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

h) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cognitive	Application	05
Davahamatan	Operating Skills	10
Psychomotor	Drawing / drafting skills	10
Affactive	Discipline and punctuality	10
Allective	Decency and presentation	10
	TOTAL-	50

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted . Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES : Instructional Methods :

1. Lectures

2. Demonstration during practicals

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations

REFERENCE MATERIAL :

Reference Books :-

Author	Title	Publisher
S. K. Hajra Chaudhary,	Elements of workshop Technology -	Media Promoters and
Bose, Roy	Volume I & II	Publishers limited
B.S. Raghuvanshi	Elements of workshop Technology -	
	Volume I & II	Dhanpat rai & Sons
R. K. Jain	Production Technology	Khanna Publication New
		Delhi
Production Technology	Hindustan Machine Tools (HMT)	Tata Publication

b) Websites

1)<u>http://nptel.ac.in</u> 2)<u>www.egr.msu.edu/~pkwon/me478</u>

3)www.basicmechanicalengineering.com/lathe~machine~operation~basic:turning.operations

4)<u>www.planomillers.com/drilling.machine.html</u>

5)<u>www.jsw.co.in/en/products/injectionmoulding</u>

6)http://www.opm.gov/fedclass/fws3869.pdf

* * *

COURSE ID:

COURSE ID:

Course Name	: APPLIED ELECTRONICS
Course Code	: MEF307
Course Abbreviation	: FATX

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	04

Evaluation Scheme:

	Progressiv	ve Assessment	Term				
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total	
Details of Evaluation	Average of two tests of 20 marks each	i) 25 marks for each practicalii) One PST of 50 marks	Term End Theory Exam (03 hours)	As per Pro forma- III	As per Performa-		
Marks	20		80	25	-	125	

Rationale:

Nowadays electronic circuits are extensively used in industries as well as in domestic uses like fan speed regulators, light flashers, electronic door bells etc. Hence knowledge of various types of electronic components, circuits and their applications is a necessity for an engineer from any branch of engineering. For understanding the operation of any circuit it is essential to understanding the principles of operation of the basic devices used in electronic circuits and the operation of some of simple circuits' basic electronics, applied electronics & digital electronics which forms the subject matter of this paper.

COMPETENCY:

Understand fundamental principle and concept of basic electronic devices. **Cognitive:** Understand symbol, characteristics of diode and transistor. **Psychomotor:** Build and operate simple basic electronics circuit. **Affective:** Attitude of i) Identify ii) Draw iii) Operate v) Test

COURSE OUTCOMES:

MEF 307-1 Differentiate conductor insulator and semiconductor in engineering industry.

MEF 307-2 Identify and operate rectifier and filter for engineering applications

MEF 307-3 Illustration of basic elements to DC power supply.

MEF 307-4 Classify different number systems and codes to use it properly in future.

MEF 307-5 Explore combinational circuits and ICs for logic design in industry.

MEF 307-6 Explore sequential circuits and ICs for logic design in industry.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels :1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1Operat e and Maintai n	PSO 2Superv ision and Providin g Solution
Competency: Understand fundamental principle and concept of basic electronic devices	-	3	3	-	-	-	-	1	-	-	1	1
MEF307-1	2	-	-	-	-	-	-	1	-	-	1	1
MEF307-2	1	2	2	-	-	-	-	1	-	-	1	1
MEF307-3	1	2	2	-	-	-	-	1	-	-	1	1
MEF307-4	1	1	2	-	-	-	-	1	-	-	1	1
MEF307-5	1	1	2	-	-	-	-	1	-	-	1	1
MEF307-6	-	3	3	-	-	-	-	1	-	-	1	1

SECTION - I

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
ME	F 307-1 Differentiate conductor insulator and semiconductor i	n engineering	g industry.
1	SEMICONDUCTOR DEVICES	06	14
1.	1 1 Conductor Insulator semiconductor	00	14
	1.1 Conductor, Insulator, Semiconductor.		
	1.2 Intrinsic semiconductor: 51, Ge		
	1.3 Doping, Trivalent and Pentavalent impurities		
	1.4 Extrinsic semiconductor : P-type, N-type		
	1.5 P-N junction diode		
	1.5.0. Symbol		
	1.5.1. Construction		
	1.5.2. Characteristics : Forward Bias and Reverse Bias		
	1.5.3. Applications.		
	1.6 Zener diode		
	1.6.0. Symbol		
	1.6.1. Construction		

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
	1.6.2. Characteristics : Forward Bias and Reverse Bias		
	1.6.3. Applications		
	1.7 Bipolar Junction Transistor		
	1.7.0. Operating principal of NPN and PNP transistor.		
	1.7.1. Transistor configurations: Common base, common		
	collector, Common emitter (circuit configuration		
	and comparison)		
	1.8 Need of Transistor Biasing.		
	1.9 Study of single stage amplifier.		
	1.9.0. Construction		
	1.9.1. Operation		
	1.9.2. waveforms		
	1.9.3. Applications.		
	11		
MEF	307-2 Identify and operate rectifier and filter for engineering a	pplications	•
2.	RECTIFIERS AND FILTERS	05	14
	2.1 Rectifier: Half wave, Full wave and Bridge rectifier		
	(no numerical)		
	2.1.0. Circuit diagram		
	2.1.1. Operation		
	2.1.2. Waveforms.		
	2.2 Comparison of rectifiers -efficiency, Ripple factor &		
	Applications.		
	2.3 Need of filter circuit.		
	2.4 Type of Filters: L, C, L-C, π - filters.		
	2.4.0. Circuit diagram		
	2.4.1. Operation		
	2.4.2. Waveforms.		
	2.5 Comparison of filters.		
MEF	307-3 Illustration of basic elements to DC power supply.	1	1
3.	REGULATED POWER SUPPLY	05	12
	3.1 Block diagram of regulated power supply.	00	
	3.2 Zener diode as a voltage regulator.		
	3.2.0.Circuit Diagram		
	3.2.1 Operation		
	3.2.2. Characteristics		
	3.2.3. Applications		
	3.3 Regulator ICs 78XX. 79XX series of fixed voltage		
	Regulators.		
	3.3.0. Pin Diagram		
	3.3.1. Features		
	3.4 Switch Mode Power Supply (SMPS)		
	3.4.0.Block diagram		

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
	3.4.1.Description		
	3.5 Block diagram of UPS.		
	3.5.0.Concept of online UPS		
	3.5.1.Concept of offline UPS		
	TOTAL	16	40
Semeste allotted	r end exam question paper should be such that total marks of questions on each top above but the candidates are able to attempt questions of the above allotted marks o	ic is one and half	f times the marks

Sr. No.	Topics		Theory evaluation
			Marks
MEF	307-4 Classify different number systems and codes to use it prop	erly in futu	re.
4.	DIGITAL ELECTRONICS	04	10
	4.1 Decimal, binary, octal and hexadecimal number systems.		
	4.2 Decimal to binary and binary to decimal conversion.		
	4.3 Decimal to octal and octal to decimal conversion.		
	4.4 Decimal to hex and hex to decimal conversion.		
	4.5 Binary to hex and hex to binary conversion.		
	4.6 Logic Gates: Symbols, truth table.		
	4.7 Boolean Algebra and Demorgans theorem.		
MEF	307-5 Explore combinational circuits and ICs for logic design in	industry.	
5.	COMBINATIONAL CIRCUITS	06	15
	5.1 Sum of product and product of sum reduction.		
	5.2 Max term and Min term, conversion between SOP and		
	POS form.		
	5.3 K – map reduction techniques (up to 3 variables).		
	5.4 Adders/ Subtractor: Half adder, Full adder, Half		
	subtractor and Full subtractor		
	5.4.0. Block diagram		
	5.4.1.Truth Table		
	5.4.2. Principal of operation.		
	5.5 Multiplexer: 2:1,4:1,8:1		
	5.5.0.Block diagram		
	5.5.1.Truth Table		
	5.5.2. Principal of operation.		

SECTION - II

5.6 Demultiplexer: 1:4,1:8				
5.5.0.Diagram				
5.5.1.Truth Table				
5.5.2. Principal of operation.				
MEF 307-6 Explore sequential circuits and ICs for logic design in indu	ıstry.			
6. SEQUENTIAL CIRCUITS	06	15		
6.1 Flip-Flops: SR, JK, T, D Flip-flop and latch.				
6.1.0. Symbol				
6.1.1. Truth Table				
6.2 Register Modes - SISO, SIPO, PIPO, PISO				
6.2.0. Logic Diagram				
6.2.1. Description				
6.2.2. Applications.				
6.3 Counter: Synchronous and Asynchronous				
6.3.0.Up counter				
6.3.1.Down counter				
6.3.2. mod N (up to 10)				
ΤΟΤΑΙ	16	40		
IOTAL	10	ΨU		
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks				
allotted above but the candidates are able to attempt questions of the above allotted marks only.				

NOTE→For setting of question paper, marks per topic should be 1.5 times the al/loted Marks **Specification** Table for Question Paper of Theory Examination:

		Distribution of marks (level wise)			Course	Total
Section / Topic no.	Name of topic	Remember	Understand	Application	Outcom e	marks
	Semiconductor				MEF307-1	
I/1	Devices	4	4	6		14
I/2	Rectifiers and Filters	3	4	7	MEF307-2	14
I/3	Regulated Power Supply	2	4	6	MEF307-3	12
II/4	Digital Electronics	3	3	4	MEF307-4	10
II/5	Combinational Circuits	3	4	8	MEF307-5	15
II/6	Sequential Circuits	4	4	7	MEF307-6	15

B) TERMWORK: Term work shall consist of the following: (Minimum Eight from List) Laboratory experiences and related skills developed.

Sr. No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	PN junction diode characteristics.	 Connect the various component as per the circuit diagrams using proper size wires 	MEF 307-1

		2) Measure the forward & reverse voltage &	
		current	
		3) Draw the forward & reverse characteristics	
2	Zener diode characteristics.	1) Connect the various component as per the	MEF 307-1
		circuit diagrams using proper size wires	
		2) Measure the forward & reverse voltage &	
		current	
		3) Draw the forward & reverse characteristics	
3	Half wave Rectifier.	1) Make proper connection as per circuit diagram	MEF 307-2
		2) Observe the waveform on C.R.O.	
4	Center-tapped full wave	1) Make proper connection as per circuit diagram	MEF 307-2
	Rectifier.	2) Observe the waveform on C.R.O.	
5	Capacitor Filter	1) Make proper connection as per circuit diagram	MEF 307-2
		2) To show the waveform on C.R.O.	
6	Regulators ICs(78XX,79XX	1)Make the proper connections and measure the	MEF 307-3
	Series)	regulated output voltage	
7	Logic gates.	1) Test ICs for truth-table.	MEF 307-4
		2) Connect as per circuit and find truth-table.	
8	MUX/DEMUX decoder.	1) Connect power supply	MEF 307-5
		2) Check output using circuit.	
9	Verification of truth table of	1) Connect power supply	MEF 307-6
	JK, T, D flip-flop.	2) Connect clock circuit	
		3) Check truth table using LEDs.	
10	Synchronous counter	1) Connect power supply	MEF 307-6
-		2) Connect clock circuit	
		3) Check truth table using LEDs.	

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

i) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks as per given criteria

Domain	Particulars	Marks out of 25
Cognitive	Understanding	05
Cognitive	Application	05
Davahamatan	Operating Skills	05
Psychomotor	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
	25	

ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram.	10
2	Observations & Result Table	10

3	Sample Calculations with relevant Formulae.	10
4	Proper Graphs & Procedure / workmanship Safety measures	10
5	Oral Based on Term Work	10
	Total	50

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Discussions2. Regular Home Assignments.3. Laboratory workTeaching and Learning resources:

 1. Chalk board
 2. Video clips
 3.Slides
 4. Item Bank
 5. Charts

 References:

 A) Beelee

A) Books

Sr.	Author	Title	Publisher
No.			
01	V K Mehta	Principles of Electronics	S. Chand and company Ltd.
02	Paul Malvino	Electronic Principles	Tata McGraw Hill Publishers
03	A Mottershed	Electronic Devices and	Prentice Hall of India
		Components	
04	R P Jam	Modern Digital Electronics	Tata McGraw Hill Publishers
05	Grob Bernard	Basic Electronics	Tata McGraw Hill Publishers

B) Websites

1) www.ni.com/pdf/manuals/371585a.pdf

2) proton.ucting.udg.mx/tutorial/multisim/mm 9/MultiSIM_9_PRO.pdf

3) www.engr.newpaltz.edu/~bai/CSE45208/ewb.pdf

* * *

COURSE ID:

Course Name	: THEORY OF ENGINEERING DESIGN.
Course Code	: MEF 305
Course Abbreviation	: FTED

TEACHING AND EVALUATION SCHEME : Pre-requisite Course(s) : CCF110 Applied Mechanics

Teaching Scheme :

Scheme component	Hours / week	Credits	
Theory	03	05	
Practical	02	05	

Evaluation Scheme :

Mode of	Progressiv	ve Assessment	Theory Term	TAI	
Evaluation	Theory	Practical	Examination	Work	Total
Details of Evaluation	Average of two tests of 20 marks each	I.25 marks for each practical II.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	
Marks	20		80	25	125

RATIONALE :

This course is a continuation of Applied Mechanics. It deals with mechanics of deformable bodies. Effects of various force systems on various machine components can be studied and deformations and stresses can be determined using the principles. Mechanical properties of engineering materials are also studied in this course. It lays a foundation for the course Machine Design.

.COMPETENCY :

Apply principles of theory of engineering design to solve engineering problems.

Cognitive : Understanding and applying principles of theory of engineering design to engineering problems

Psychomotor: i) Operating testing machines ii) plotting graphs and diagrams.

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

COURSE OUTCOMES :

MEF305-1 Analysis of basic mechanical actions and behavior of materials under the action of forces.

MEF305-2 Solve problems on shear force and bending moments in beams.

MEF305-3 Determine moment of inertia of plane composite sections.

MEF305-4 Solve problems on direct & bending and shear stresses in beams.

MEF305-5 Determine principle stresses in structural components

MEF305-6 Solve problems on torsion for circular sections.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipl ine knowle dge	PO 3 Experime nts and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environme nt and sustainabili ty	PO 7 Ethics	PO 8 Individua l and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Work in mfg& service sector	PSO 2 Start entreprene urial activity
Competency	3	-	2	-	-	-	-	2	-	2	-	-
MEF305-1	3	-	2	-	-	-	-	2	-	2	-	-
MEF305-2	3	-	-	-	-	-	-	-	-	2	-	-
MEF305-3	3	-	-	-	-	-	-	-	-	2	-	-
MEF305-4	3	-	-	-	-	-	-	-	-	2	-	-
MEF305-5	3	-	2	-	-	-	-	-	-	2	-	-
MEF305-6	3	-	2	-	-	-	•	2	-	2	-	-

CONTENT : A) THEORY

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
•	MEF305-1Analysis of basic mechanical actions and behavior of materia	als under th	ne action of
forces.			
1	Axial Tension and Compression		
	1.9 Basic mechanical actions : axial tension, axial compression, flexure, shear, torsion, Combination of basic mechanical actions	08	12
	1.10 Behavior of ductile and brittle material under tension.		
	1.11 Definition of axial and eccentric loading. Definition of uni-axial, bi-		
	axial and tri-axial loading. Diagrams showing these loadings.		
	1.12 Examples of components in axial tension and compression.		
	1.13 Numerical problems on deformations of uni-axial members made up of		
	i) single material ii) combination of two or more materials along the length		
	(compound members). Practical examples.		
	1.14 Composite sections : Stresses and elongation under uni-axial loading.		
	Modular ratio.		
	1.15 Lateral strains and deformation. Poisson's ratio.		
	1.16 Volumetric stress and strain, bulk modulus.		
	1.9 Shear stresses and shear strains. Modulus of rigidity.		
	1.10 Relation among elastic constants.		
	1.11 Temperature stresses in simple member.		

	MEF305-1Analysis of basic mechanical actions and behavior of materi	als under th	ne action of
forces.			
2	Strain Energy		
	2.1Definition of strain energy, resilience, proof resilience and modulus	04	08
	of resilience. Strain energy stored due to gradual, sudden and impact		
	loading		
	2.2 Stresses and elongation due to gradual, sudden and impact loading		
	MEF305-2 Solve problems on shear force and bending moments in beau	ns.	
3	Shear Forces and Bending Moments in Beams		
	3.1 Types of beams : simply supported, over-hanging, cantilever, propped	08	12
	cantilever, fixed, continuous. Types of loads : concentrated loads, uniformly		
	distributed loads and uniformly varying loads, couple loads		
	3.2 Definition of shear force and bending moment at a section, Sign		
	convention. Relation between shear force and bending moment		
	3.3 problems on Shear force diagrams and bending moment diagrams for		
	cantilever, simply supported and overhanging beams subjected to above loads.		
	MEE 205. 2. Determine an entre of in antiperformer and the sections		
	MEF 303-3 Determine moment of inertia of plane composite sections.		
	Moment of Inertia		
	4.1Definition of moment of inertia. Moment of inertia of regular plane	04	08
4	figures square rectangle triangle circle		
	4.2Parallel axes theorem and perpendicular axes theorem		
	4.3Moment of Inertia of composite figures. Radius of gyration		
	Total	24	40
Semester	end exam question paper should be such that total marks of questions on each topic is or	ne and half tin	nes the marks
allotted al	bove but the candidates are able to attempt questions of the above allotted marks only.		

Section II

Sr. No.	Topics	Teachi ng	Theory Evaluati		
	MEF305-4 Solve problems on Direct, bending stresses in beams.				
5	 Direct and Bending Stresses 5.1Flexural behavior of beams: Definition and assumptions in theory of simple bending. Tension and compression zones, neutral axis, bending stresses, stress distribution over the section, moment of resistance, section modulus. Flexural formula and its application (no derivation) 5.2Concept of direct and eccentric loading. Practical examples. 5.3Stresses in machine components subjected to eccentric loads with eccentricity about only one axis. Core of section 	08	12		
	MEF305-4 Solve problems on shear stresses in beams				
6	 Shear Stresses in Beams. 6.1 Assumptions and shear stress formula. (no derivation) 6.2 Shear stress distribution across different across sections of beam. e.g. rectangular, circular, I section, T section. 6.3 Relation between maximum and average shear stress. 	04	08		

MEF30	5-5 Solve problems on principal stresses and planes.			
7	Principal Stresses and Principal Planes.			
	7.1Definition of principal stresses and principal planes. Different states of	04	08	
	stresses. Diagrammatic representation.			
	7.2Analytical method : Determination of normal and shear stresses on			
	oblique planes of an element subjected to axial stresses and / or shear			
	stresses. Resultant stress and its obliquity. Determination of principal			
	planes, principal stresses, maximum shear stresses and their planes. Planes			
	of maximum obliquity.			
	7.3Graphical method : Mohr's circle method to determine the above			
	stresses and planes.			
	MEF305-6 Solve problems on Torsion.			
8	Torsion in Shafts.			
	8.1Assumptions in theory of torsion. Definition of torsional load, twisting			
	moment, angle of twist. Torsional equation, shear stress distribution across			
	a section of solid and hollow circular shaft.	08	12	
	8.2 Torsional strength of hollow and solid shafts. Saving in weight due to			
	hollow shafts. Power transmitted by shafts.			
	8.3 Combined torsion and bending			
	Total	24	40	
Semeste	Semester end exam question paper should be such that total marks of questions on each topic is one and			
half tim	es the marks allotted above but the candidates are able to attempt questions	of the abo	ve allotted	
marks of	nly.			

Specification table for setting question paper for semester end theory examination :

Торі	Name of topic	Distribution of Marks (Cognitive level wise)			Course Outcome	Total
c no.	_	Remember	Understand	Apply		Marks
1	Axial Tension and Axial Compression.	02	02	08	MEF305-1	12
2	Strain energy.	02	02	04	MEF305-1	08
3	Shear Forces and Bending Moments in Beams.	02	02	08	MEF305-2	12
4	Moment of Inertia.	02	02	04	MEF305-3	08
5	Direct & bending Stresses in Beams.	02	02	08	MEF305-4	12
6	Shear stresses in beam.	02	02	04	MEF305-4	08
7	Principal stresses and strains	02	02	04	MEF305-5	12
8	Torsion in shaft.	02	02	08	MEF305-6	08
	Total	16	16	48		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above. Candidates can attempt questions of the above allotted marks only.

B) TERM WORK :Term work shall consist of the following : **a)Laboratory Experiments.** (any eight)

(Laboratory N	Aanual on theory o	f engineering design	<i>i</i> developed by th	e Institute shall be used)

Sr.	Laboratory experiments (Any eight)	Competencies to be developed	Course Outcome
1	Study of the universal testing machine.	Identify different parts of machine and their actions.	
2	Tension test on mild steel bar.	Determine mechanical properties of mild steel.	
3	Tension test on HYSD steel bar.	Determine mechanical properties of HYSD steel.	MFF-1
4	Compression test on metals.	Interpret failure pattern (behavior)of metal under compression action	
5	Izod Impact test on metals.	Discriminate various materials on the basis of strain energy absorbed.	
6	Charpy Impact test on metals.	Discriminate various materials on the basis of strain energy absorbed.	
7	Deflection and Flexural test on mild steel	Determine deflection of material .under loading.	MEF-4
8	Shear test on metals	Discriminate failure under single and double shear action.	
9	Brinell Hardness test on metals	Interpret BHN of different metals	MEF-1
10	Rockwell hardness test on metal	Interpret RHN of different metals.	
11	Torsion test on mild steel	Determine torsional strength of steel.	MEF-6

b) Graphical Assignment :

1 Mohr's circle -4 problems

2 Shear force and bending moment diagrams - 4 problems

c) Micro Projects :

Survey of machines : Students shall conduct (in a group of 3) a survey by actually visiting various types of machines for the actions of forces mentioned in the theory syllabus and prepare a report with their photographs as guided in the Laboratory Manual on*theory of engineering design* developed by the Institute .

d). Software based exercises :

Students shall carry out four software based exercises (as guided in the *Laboratory Manual on theory of engineering design* developed by the Institute) on one or more of the following :

i)study of variation of parameters of phenomena .

ii)information collection and presentation

iii)self-study of a topic

C. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Field examples of course application	Term-work assignment on survey of
		Equipments or machines

ASSESSMENT CRITERIA FOR TERM WORK :

a) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given in *Laboratory Manual for* theory of engineering design

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Laboratory Manual for* theory of engineering design

Final marks of term work shall be awarded as per Assessment Pro-forma III.

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

1. Lectures cum Demonstrations

2. Tutorial exercise

Teaching and Learning resources :

- 1. Chalk board
- 2. Use of charts
- 3. Audio visual presentations
- 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Timoshenko, S.P. and Young, D.H.	Elements of Strength of Materials	Affiliated East West Press Pvt. Ltd., Delhi
2.	Deo, Sunil	Text book on Mechanics of Structures	Nirali Publications
3.	Bhavikatti, S.S.	Strength of materials.	Vikas publishing
			house pvt Ltd.
4.	Khurmi, R.S.	Strength of Materials	S. Chand & Co., Delhi
5.	Singer, F.L.	Strength of Materials	Harpe Collins Publishers India Delhi
6	S Ramamurtham & Narayan	Strength of materials	Danpat Rai
7	S.S Ratan	Strength of materials	Tata McGraw-Hill

b) Websites

- iii. en.wikipedia.org/wiki/Structural mechanics
- iv. http://www.powershow.com/view/15b5baNzRmY/CE_203Structural_Mechanics_powerpoint_ppt_presenta tion

* * *

COURSE ID: Course Name : THEORY OF MACHINES & MECHANISMS Course Code : MEF308 **Course Abbreviation** : FTMM

TEACHING AND EVALUATION SCHEME : Pre-requisite Course(s) : Nil **Teaching Scheme :**

0		
Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	03

Evaluation Scheme:

	Progressiv	ve Assessment	Term			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	iii. 25 marks for each practicaliv. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-I	
Marks	20		80	50	25	175

RATIONALE:

Mechanical Engg. Diploma holders are more concern with various mechanisms, and machines in workshops, industries and in practices. The diploma technicians therefore have knowledge of repair, keep maintenance, modify if required the various machines and mechanism. He should able to analyze and identify construction, interpret operation and become expertise in repair and maintenance of various machines and mechanism. This course is a study of different mechanism, their analysis and synthesis, which includes study of motion and forces concerning different part of mechanisms. Also it makes student's acquaint to study about transmission and transformation of motion, its analysis its and improvement.

COMPETENCY: Select suitable mechanical power transmission devices.

Cognitive: Interpret different mechanisms and their applications. **Psychomotor:** Construct velocity, acceleration diagrams and Cam profile for controlling the motion. Affective: Attitude of i) Analytical Thinking ii) Graphical Solutions iii) Accuracy **COURSE OUTCOMES:**

- MEF308.1- Construct various mechanism and their applications
 MEF308.2- Determine velocity and acceleration of different mechanism by Graphical Method
 MEF308.3- Construct different types of Cam Profiles for given data.
 MEF308.4- Select power transmission devices.
 MEF308.5- Calculate torque and power transmission.
 MEF308.6- Select governors for various machines.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competenc yandCOs	PO 1 Basic knowle dge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practic e	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commu nication	PO 10 Life- long learnin g	PSO1 Work in mfg& service sector	PSO 2 Start entrepr eneuria l activity
Competenc y:	2	1	-	-	-	-	-	-	-	-	1	1
MEF308-1	3	1	-	-	-	-	-	-	-	-	1	1
MEF308-2	2	1	-	-	-	-	-	-	-	-	1	1
MEF308-3	3	1	-	-	-	-	-	-	-	-	1	1
MEF308-4	2	1	-	-	-	-	-	-	-	-	1	1
MEF308-5	2	1	-	-	-	-	-	-	-	-	1	1
MEF308-6	3	1	-	-	-	-	-	-	-	-	1	1

NTENT: A. THEORY:

SECTION - I

Sr. No.	Topics	Teachin g (Hours)	Theory Evaluatio n Marks	
Cour	se Outcome MEF308.1- Construct various mechanism and their application	ations		
1.	 FUNDAMENTALS OF MECHANISMS 1.1 Link, Kinematic link, Types of links, Structure, Difference between machine and Structure 1.2 Kinematics pair and its type, Constrained Motion and its types Kinematics chain, Mechanism and machines 1.3 Four bar mechanism ,its inversions and Characteristics 1.4 Single slider crank chain and its inversions 1.5 Double slider crank chain and its inversions 	06	12	
	<i>Course Outcome</i> MEF308-2: <i>Determine velocity and acceleration of different mechanism by</i> <i>Graphical Method</i>			

2.	 VELOCITY AND ACCELERATION ANALYSIS 2.1 Absolute and relative motion 2.2 Motion of a link, angular velocity of link 2.3 Determination of velocity of link by relative velocity method 2.4 Acceleration, angular acceleration, Centripetal and tangential 	08	14
	 2.4 Acceleration, angular acceleration, Centripetal and tangential acceleration 2.5 Determination of acceleration in simple mechanisms 2.6 Klein's construction to determine velocity and acceleration 		

3.	 LOWER PAIRS 3.1 Straight Line Mechanisms 3.2 Paucellier, Hart, Scott-Russell, Grass-Hopper, Tchebicheff Mechanisms 3.3 Pantograph 3.4 Types of Steering Gear- Davis and Ackermann Steering Gear 	04	06
	Course OutcomeMEF308-3- Construct different types of Cam Profil	es for given	data.
4.	 CAMS 4.1 Types of cams, types of followers 4.2 Terminology of cams 4.3 Motion of followers: Uniform velocity, Simple harmonic motion and Uniform acceleration and retardation 4.4 Construction of cam profile (Knife edge, roller and flat follower) 	06	08
	Total	24	40
Seme and h allotte	ester end exam question paper should be such that total marks of questi- alf times the marks allotted above but the candidates are able to attempt ed marks only.	ons on each ot questions	topic is one of the above

SECTION – II

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
	<i>Course Outcome</i> MEF308.4- Selectpower transmission de	evices.	
5.	 POWER TRANSMISSION 5.1 Belt Drives: Types, Material, velocity ratio, Length of belt, Slip and Creep, Ratio of tensions, Initial tension, Centrifugal tension. (Simple Numerical) 5.2 Power transmitted by flat belt drive& V belt drive, Condition for maximum power transmission (Simple Numerical) 5.3 Rope Drives: Types, Material, Application, Advantages and Limitations 5.4 Chain Drive: Types, Material, Application, Advantages and Limitations 	08	12

6.	GEARS AND GEAR TRAINS		
	7.1 Gears: Types, Materials, Terminology of gears.		
	7.2 Forms of teeth, cycloidal and involute profile teeth, comparison	06	10
	between them.		
	7.3 Gear Trains: Types, Velocity ratio (Simple Numerical)		
	Course Outcome MEF308.5- Calculate torque and power tra	nsmission	
7.	FRICTION CLUTCHES		
	6.1 Types of clutches: single plate, multi plate, cone, centrifugal		
	Clutches	04	08
	6.2 Derivation for torque and power transmission by uniform		
	pressure and uniform wear theory (Simple Numerical)		
	Course OutcomeMEF308.6- Select governors for various n	nachines.	
0	COVEDNODS		
0.			
	8.1 Governor: Need, Function, Terminology, Classification and		
	Application	06	10
	8.2 Construction and working of Centrifugal, Watt, Porter, Proell,		
	Hartnell, Wilson-Hartnell, Pickering and inertia type governor		
	Total	24	40
Seme	ester end exam question paper should be such that total marks of question	ons on each	topic is one
and h	alf times the marks allotted above but the candidates are able to attemp	ot questions	of the above
allotte	ed marks only.	1	

Specification table for setting question paper for semester end theory examination:

Торі	Nome of torio	Distributi	on of marks (level-wise)	Course	Total Mark	
c No.	Name of topic	Rememb er	Understan d	Applica- -tion	Outcome	S
1	Fundamental and types of mechanisms	4	4	4	MEF308-1	12
2	Velocity and acceleration analysis	4	4	6	MEF308-2	14
3	Lower Pairs	2	2	2	MEF308-1	06
4	Cams	4	6	-	MEF308-3	08
5	Power Transmission	4	4	4	MEF308-4	12
6	Gears and gear trains	4	2	4	MEF308-4	10
7	Friction clutches	4	-	4	MEF308-5	08
8	Governors	3	4	3	MEF308-6	10
	Total	27	20	33		80

B. TERM WORK

Practical Exercises and related skills to be developed:

Sr. no	Laboratory experience	Skills developed	Course Outcome
1	List the mechanisms available in the surrounding; identify its name, links, kinematic pairs and type of kinematics pair, types of inversions.	Observation and collection of information regarding various mechanisms in view of theoretical concepts.	MEF308-1
2	Solve any two problems on velocity &acceleration in mechanism. i) By Relative Velocity Method ii) Klein's Construction	Solving problems by graphical method	MEF308-2
3	Assignment on Lower pair mechanisms	Understand various mechanisms and their applications	MEF308-1
4	Construction of cam profiles with two different follower motion	Skill required to draw cam profile	MEF308-3
5	Identify type of clutch mechanism from an automobile and calculate torque, power etc.	Calculate torque and power transmission for identified type of clutch	MEF308-5
6	Study of belt, rope and chain drives	Observation, drawing & collection of information regarding various types of drives.	MEF308-4
7	Assignment on gear & gear trains	Understand gear types, terminology and applications	MEF308-4
8	Demonstration of Governor	Calculation of Angular Velocity ,Radius of rotation and Centrifugal Force	MEF308-6

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Criteria for Continuous Assessment of Practical work and Progressive Skill Test: i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per following criteria

Sr. No.	Criteria	Marks allotted
1	Quality and neatness of term work	05
2	Attendance	05
3	Participation	05
4	Understanding	05
5	Representation	05
	Total	25

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted.

iii) Term-end Oral/Practical Examination :

Term-end Oral Examination shall be conducted as per the following criteria:

Sr. no	Criteria	Marks allotted
1	Understanding	10
2	Quality and neatness of term work	05
3	Participation	05
4	Presentation	05
	Total	25

INSTRUCTIONAL STRATEGIES :

Instructional strategies:

- **1** Lectures and discussions.
- 2 Laboratory experiences and laboratory interactive sessions.
- **3** Time bound assignments.

Teaching and Learning resources, including references:

- 1 Chalk-board.
- 2 Demonstrative kits.
- **3** Demonstrative charts.

Criteria for assessment at semester end practical exam:

Sr. no	Criteria	Marks allotted
1	Correct figures / diagrams	15
2	Observation tables	10
3	Result table / calculations / graphs	15
4	Safety / use of proper tools / workmanship	10
	Total	50

REFERENCE MATERIAL :

a) Books

Sr. No.	Author	Title	Publication
01	P. L. Ballaney	Theory of machines	Khanna Publishers, Delhi
02	Thomas Bevan	Theory of machines	Pearson Education, India
03	S.S. Rattan	Theory of machines	Tata McGraw Hill
04	R.S. Khurmi & J.K. Gupta	Theory of machines	S. Chand & co. Ltd.

b) Websites

- books.google.co.in/books/about/Theory_of_Machines.html?id...
 www.freebookez.com/theory-of-machine-by-r-s-khurmi/
 mechatronics2u.blogspot.com/.../theory-of-machines-by-khurmi-e-book.html

COURSE ID:

Course Name	: ELECTRICAL TECHNOLOGY
Course Code	: MEF309
Course Abbreviation	: FELT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <*nil* >

Teaching Scheme :

Hours / week	Credits
02	04
02	04
	Hours / week 02 02

Evaluation Scheme :

	Progressiv	ve Assessment	Term			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	 i. 25 marks for each practical ii. One PST of 25 marks 	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-	
Marks	20		80	25		125

Rationale:

The basics of Electrical engineering are in the study of simple preliminary circuits provided with D.C supplies. All Electrical Engineering applications are based on the behavior of the three basic parameters viz. resistance, inductance and capacitance when provided with different types of energy inputs (e.g. Direct current and alternating current).

Students should deal with the the electro-magnetic devices work on the principle of magnetism and electromagnetism. All electrical machines can be studied and understood only if these principles are well understood with a little bit of sound mathematical base. Principle, construction and applications of various electrical measuring instruments used in electrical circuits. This course aims to empower mechanical engineering students with basic knowledge of electricity and its field applications related to industries.

Course competency: Use and maintain equipments based on AC-DC electric supply system. Course outcomes:

MEE309-01: Make calculations of power and energy using electrical components.

MEE309-02: Measurement of electrical quantities in RLC series circuit.

MEE309-03:Use and maintain star and delta loads and earth testing using megger.

MEE309-04:Use and Calculate efficiency and regulation of single phase transformer.

MEE309-05: Apply knowledge and Use and heating and illumination systems.

MEE309-06:Select and Use and DC motors.

MEE309-07:Use and maintain AC motors with starter and their selection.

	Programme Outcomes Pos and PSOs											
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Communi cation	PO 10 Life-long learning	PSO1 Work in mfg& service sector	PSO 2 Start entrepren eurial activity
Competency:	1	-	1	-	-	-	-	1	-	-	1	1
MEE 309-01	1	-	1	-	-	-	-	1	-	-	1	1
MEE 309-02	1	-	1	-	-	-	-	1	-	-	1	1
MEE 309-03	1	-	1	-	-	-	-	1	-	-	1	1
MEE 309-04	1	-	1	-	-	-	-	1	-	-	1	1
MEE 309-05.	1	-	1	-	-	-	-	1	-	-	1	1
MEE 309-06	1	-	1	-	-	-	-	1	-	-	1	1
MEE309-07	1	-	1	-	-	-	-	1			1	1

CONTENT

A. THEORY

	Section I		
Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)
MEE30 9	0-01: Make calculations of power and energy using electrical con	nponents.	
1. MEE309	 Introduction to elements of electric networks 1.1. Ohm's law and Definition of Electric networks 1.2. Definitions of Resistance, Inductance, and capacitance. 1.3 Equivalent resistance of series, parallel and combination resistance systems. 1.4 Kirchhoff's laws 1.5 Work, power and energy 1 6 Simple numerical problems based on the above. 	05	12
2	 Measuring Instruments & Alternating Current Circuits: 2.1 Types of Measuring Instruments 2.2 Use of Ammeter, Voltmeter, Wattmeter, Energy meter, Clip – on – Meter & Digital Multi meter . 2.3 Law of Electromagnetic Induction 2.4 Concept of sinusoidal waveform. 2.5 Definition of cycle, frequency and periodic time. 2.6 Instantaneous value, average value, R.M.S & peak value 2.7 Purely Resistive A.C. Circuit. 2.8 Purely Inductive A.C. Circuit. 	06	16

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)
MEE30 9	D-01: Make calculations of power and energy using electrical con	nponents.	
	2.9 Purely Capacitive A.C. Circuit.		
	2.10 Definition of reactance, impedance and their units.		
	2.11 R-L, R-C and R-L-C series circuit		
MEE30 9	D-03: Use and maintain star and delta loads and earth testing using	g megger.	
3	Three Phase Alternating Current Circuits:	05	12
	3.1 Polyphase System		
	3.2 Generation of Three-Phase Voltages.		
	3.3 Three-Phase Supply Systems.		
	3.3 Three-Phase Three-Wire System.		
	3.5 Three-Phase Four-Wire System.		
	3.6 Balanced Load.		
	3.7 Voltage, Current and Power relation in STAR		
	connection.		
	3.8 Voltage, Current and Power Relation in DELTA		
	connection.		
	3.9 Earting – Necessity, Types of earthing		
	i) Plate earthing ii) Pipe Earthing		
	3.10 Megger – Construction and its use		
	Total	16	40
Semester e	end exam question paper should be such that total marks of questions on each	topic is one a	and half times the
marks allo	tted above but the candidates are able to attempt questions of the above allotte	d marks only.	

	Section II					
Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)			
MEE3	09-04:Use and Calculate efficiency and regulation of single pha	ase transforme	er.			
4	 Single Phase Transformer 4.1 Principle of working 4.2 Constructional features 4.3 E.M.F. equation statement 4.4 Voltage and current ratios of Ideal transformer. 4.5 Practical transformer 4.6 Losses and efficiency 4.7 Approximate voltage drop and regulation by Direct loading. 	04	10			
MEE3	MEE309-05: Apply knowledge and Use and heating and illumination systems.					
5	 Electric Heating (Only Description & Diagram): 5.1 Resistance Heating (Ovens). 5.2 Induction Heating Principle and Induction Heating 	05	12			

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)					
MEE3	MEE309-04:Use and Calculate efficiency and regulation of single phase transformer. Furnaces.							
	Furnaces.5.3 Block Diagram/ Schematic Diagram and workingofinduction Furnace.5.4 Dielectric heating principles.5.5 Block Diagram/ Schematic Diagram of dielectricheatingUnit.5.6 Application of above heating system.5.7 concepts Illumination.5.8 Laws of Illumination5.9 Illumination level for different working areas							
MEE3	309-06: Select and Use and DC motors							
6	 Electrical Motors : D.C. Motors 6.1 Need of D. C. Machines 6.2 Classifications , Schematic representation and their applications. 6.3 Working Principle , Construction and applications of a) Stepper Motor b) Servo Motor 	03	08					
MEE3	09-07:Use and maintain AC motors with starterand their selection	1.	T					
7	 Electrical Motors: A.C. Motors 7.1 Classification and characteristics of single-phase and three-phase motors (Only torque-speed). 7.2 Their schematic representation and their applications. 7.3 Study of different types of starters used for three-phase Squirrel cage and slip-ring induction motors. 7.4 Reversal of rotation 7.5 Industrial applications. 	04	10					
	Total	16	40					
Sem the mar	ester end exam question paper should be such that total marks of questions on a stallotted above but the candidates are able to attempt questions of the above a	each topic is o llotted marks	one and half times					

Specification table for setting question paper for semester end theory examination:

Section		Distrib	ution of mar wise)	Total	Course outcomes	
/ Topic no.	Name of topic	Reme mber	Under standing	Applic a tion	mark s	
I / 1	Introduction to elements of electric networks.	4	4	4	12	MEE309-01
I / 2	Measuring Instruments& A.C.	4	4	8	16	MEE309-02

	Circuits .					
I / 3	Three Phase A.C.Circuits	4	4	4	12	MEE309-03
II / 4	Single Phase Transformer:	2	2	4	10	MEE309-04
II /5	Electric Heating	2	4	6	12	MEE309-05
II/6	Electrical Motors : D.C. Motors	2	2	4	08	MEE309-06
II/7	Electrical Motors : A.C. Motors	2	2	4	10	MEE309-07

B.TERM WORK

Laboratory experiences and related skills developed.

Sr no	Laboratory experience	Skills developed	
1	Verify the relation for current and voltage/s in series resistances	 Connect the various components as per the circuit diagrams (after reading them) using proper size wires Write the relation for applied voltage and the voltage drops in series resistances circuit. 	MEE309-01
2	Verify the relation for current and voltage/s in parallel resistances	 Connect the various components as per the circuit diagrams (after reading them) using proper size wires Write the relation for current entering the parallel resistance circuit and the individual resistances. 	MEE309-01
3	To determine Calculation of inductance and resistance of choke coil.	 Connect the various components as per the circuit diagrams (after reading them) using proper size wires Fine the values of resistance and Inductance 	MEE309-01
4	Measurement of power by using ammeter, voltmeter & wattmeter	 Connect the various components as per the circuit diagrams (after reading them) using proper size wires Measure Current, Voltage, Power Find 	MEE309-02
5	Verification of relationship between line and phase values of voltage & current in STAR connection.	 Measure line & phase values of voltage, current. Verify their relationship for voltage & current. Calculate Power 	MEE309-03
6	Verification of relationship between line and phase values of voltage & current in DELTA connection	 Measure line & phase values of voltage, current. Verify their relationship for voltage & current. Calculate Power 	MEE309-03
7	Determination of regulation	1) Connect the various components as per	MEE309-04

Sr no	Laboratory experience	Skills developed	
	and efficiency of a single- phase transformer.	 the circuit diagrams (after reading them) using proper size wires. 2) Measure voltages, currents using voltmeters, ammeters; resistances using multi-meters and note their values in an orderly manner. 3)Calculate regulation and efficiency of a single-phase Transformer. 	
8	To Connect A.C. starters to an induction motor	 Connect the various components as per the circuit diagrams (after reading them) using proper size wires. Read the circuit diagram to connect the various starters used for A.C. Machines 3) 	MEE309-05
9	Study of steeper and Servo Motor	 Connect the various components as per the circuit diagrams (after reading them) using proper size wires. Read the circuit diagram to connect the 3-point starter 	MEE309-06
10	Industrial Visit	1) Study of induction furnace	MEE309-07

Criteria for Continuous Assessment of Practical work and Progressive Skill Test:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	2.5
2	Preparedness for practical	5
3	Correct figures / diagrams	5
4	Observation tables	5
5	Result table / calculations / graphs	5
6	Safety / use of proper tools	2.5
	Total	25

INSTRUCTIONAL STRATEGIES : Instructional strategies:

- 1) Lectures and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources, including references:

1) Chalkboard.

2) Demonstrative kits.

3) Demonstrative charts.

REFERENCE MATERIAL :

a) Books

Sr. No.	Author	Title	Publication
01	Edward Hughes	Electrical Technology	Hilly Brown Smith
02	V. N. Mittal	Basic Electrical Engineering	CBS,Delhi
03	B. L. Theraja	Electrical technology	S. Chand and Company, Delhi
04	V. K. Mehta	Fundamentals of Electrical	S. Chand and Company, Delhi
		Engineering	

b) Websites

1) www.ece.rice.edu

2) igs.nigc.ir/STANDS/BOOK/Electrical-Eng-HB.pdf

COURSE ID:

Course Name	: ENGINEERING METALLURGY AND MATERIALS
Course Code	: MEF310
Course Abbreviation	: FEMM

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <*nil* >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme :

Modo of	Progressiv	ve Assessment	Term End H		
Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	 50 marks for each practical One PST of 25 marks 	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	50	150

RATIONALE :

Mechanical Engineering students always come across with the selection of material as per requirement. So, knowledge of their properties and composition is essential. This subject deals with the solidification of metals and alloys, equilibrium diagrams and their applications. It covers metallurgical aspects of metals and alloys such as micro and macroscopic examination of metals and alloys. The subject includes study of iron-iron carbon equilibrium diagrams, ferrous and non ferrous metals, TTT diagram, various heat treatment processes and important non-destructive testing methods.

COMPETENCY : Select materials as per requirement

Cognitive : Classify various materials & heat treatment processes.

Psychomotor :i) Micro and macro testing of materials ii) Specimen preparation

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

COURSE OUTCOMES :

MEF310.1 Demonstrate the structure, properties, grades/designation of ferrous metals.
MEF310.2Interpret Iron-Ironcarbide (Fe-Fe₃C) equilibrium diagram.
MEF310.3Select various heat treatment processes.
MEF310.4 Select non-ferrous metals and non-metallic materials.
MEF310.5Choose appropriate non-destructive test for testing of material.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Learner will be able to work in various sectors.	PSO2 Start entrepre neurial activity in the Mechan ical Enginee ring
Competency:	3	_	-	_	_	_	-	-	-	_	1	2
MEF310.1	3	-	-	-	-	-	-	-	-	-	1	2
MEF310.2	3	-	-	-	-	-	-	-	-	-	1	2
MEF310.3	3	-	-	2	-	1	1	-	-	-	1	2
MEF310.4	3	-	-	-	-	-	-	-	-	-	1	2
MEF310.5	3	-	-	-	-	-	-	-	-	-	1	2

CONTENT :

E) THEORY:

	Section I		
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course	OutcomeMEF310.1Demonstratethe structure, properties, grades /d	lesignation of fer	rous metals
1	 Structure of Metals and Alloys 1.1 Need and Scope of Metallurgy 1.2 Crystal Structures of Metals :Space Lattice, Unit Cell 1.3 Types of Crystal Systems, Common Crystal Structure- BCC, FCC, HCP, Packing Factor 1.4 Mechanism of Crystallization-Nuclei formation and Crystal Growth, Dendritic Structures 1.5 Structures of alloys: Solid Solution-Types , Hume Rothery's rules 	08	12
	1.6 Imperfection of Crystals: Types : Point, Line, Surface		
2.	 Course OutcomeMEE310.2 Interpret Iron-Ironcarbide (Fe-Fe₃C) & Equilibrium Diagrams 2.1 Cooling Curves of Metals and alloys 2.2 Construction of Binary Equilibrium diagram 2.3 Phase Rule, Lever Arm Principle 2.4 Types of Equilibrium diagram - Isomorphous, Eutectic, Partial Soluble system 2.5 Reaction in Binary System –Eutectic, Peritectic, Eutectoid and Peritectoid 	equilibrium diagi 06	-am. 10

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course	OutcomeMEF310.1Demonstrate the structure, properties, grades /c	lesignation of fer	rous metals
3	 Ferrous Metals 3.1 Polymorphism and Allotropy 3.2 Allotropic transformation of pure iron 3.3 Iron-Iron Carbide Equilibrium Diagram- Peritectic, Eutectic and Eutectoid reaction 3.4 Slow cooling of steel: Microstructures of slowly cooled carbon steels 3.5 Effect of Alloying elements on Fe-C diagram 3.6 Selection of material, classification of ferrous metal 3.7 Cast Iron – Types, Properties and applications 3.8 Steel - Plain Carbon steel, Stainless steel, Heat Resisting steel, High Speed steel (HSS) 3.9 Standard specification-Designation and coding methods according to BIS, ASME, EN, DIN, JIS for plain & 	10	18
	alloy steel and cast iron.		
		24	
Semester e marks allo	and exam question paper should be such that total marks of questions on ea tied above but the candidates are able to attempt questions of the above allo	tted marks only.	d half times the

Section I	Ι
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Sr. No.		Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)					
Course	Course Outcome MEF310.3 Select various heat treatment processes								
4	Heat	Treatment	12	18					
	4.1	Purpose and importance of heat treatment.							
	4.2	Isothermal transformation of Austenite.							
	4.3	TTT diagram: Significance and construction of TTT							
		diagram for eutectoid steel .							
	4.4	Introduction to Pearlitic, Bainitic and Martensitic							
		Transformation.							
	4.5	Different heat treatments processes – (Microstructure							
		changes, advantages, limitations and applications)							
	a.	Annealing.							
	b.	Normalising .							
	с.	Hardening and Hardenability							
	d.	Tempering							
	e.	Austempering and Martempering							
	f.	Case Hardening Treatments – Carburising, Nitriding,							
		Cyaniding, Carbonitriding							
	g.	Surface Hardening Treatment - Flame Hardening and							

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Induction Hardening		
	Course Outcome MEF310.4 Select non-ferrous metals and non-me	tallic material	S
5	5.1 Non-Ferrous Metals, Alloys (Composition, properties	08	14
	and applications)		
	a. Copper and its alloys-Brasses and Bronzes		
	b. Aluminum and its alloys		
	c. Magnesium and its alloys		
	d. Bearing Alloys		
	e. Super alloys		
	f. Shape Memory alloys		
	g. Titanium alloys		
	5.2 Non-metallic materials (Properties and applications)		
	a. Polymeric Materials - types, characteristics.		
	b. Properties and uses of Thermoplastics, Thermosetting		
	Plastics.		
	c. Characteristics and uses of ABS, Acrylics. Nylons and		
	Vinyls, Epoxides, Melamines and Bakelites		
	d. Rubbers: Neoprene, Butadiene, Buna & Silicons		
	e. Composite Materials - Laminated and Fibre reinforced materials		
	f. Advanced Engineering Materials - Nano materials and		
	smart materials.		
	Course Outcome MEF310.5Choose appropriate non-destructive test for	r testing of ma	terial
6	Non-destructiveTesting of Materials	04	08
	6.1 Introduction, Scope, Importance, Working principle,		
	Advantages, Applications and Limitations of -		
	a. Radiography		
	b. MagnaFlux test.		
	c. Penetrant test		
	d. Ultrasonic test		
	e. Eddy current test		
	Total	24	40
Semeste	r end exam question paper should be such that total marks of questions on each	tonic is one an	d half times the

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination :

Торі		Distribution	of marks (Cog	Course	Total	
c No.	Name of topic	Remember	Understand	Application	Outcome	Marks
1	Structure of Metals and Alloys	02	04	06	MEF310.1	12
2	Equilibrium	02	04	04	MEF310.1	10

	Diagrams					
3	Ferrous Metals	04	06	08	MEF310.2	18
4	Heat Treatment	04	06	08	MEF310.3	18
5	Non-Ferrous Metals,					
	Alloys, Non-metallic	04	04	06	MEF310.4	14
	materials					
6	Non-destructive	02	02	04	MEE310.5	08
	Testing of Materials	02	02	04	WILL 510.5	00
TOTAL		18	26	36		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

F) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual* developed by the department in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Use Metallurgical Microscope for	3. Using the microscope	MEF310.1
	microscopic examination.	4. Adjusting the focal length	
2	standards.	 Polishing with polish papers Using double disc polishing machine Etching with etchants 	MEF310.1
3	Identify the Microstructure of the given Carbon Steel specimen (Any 2) using Metallurgical Microscope.	8. Identification of microstructure of Carbon steel	MEF310.2
4	Identify the Microstructure of the given Alloy Steel specimen (Any 2) using Metallurgical Microscope.	9. Identification of microstructure of Alloy steel	MEF310.2
5	Identify the Microstructure of the given Grey and Nodular Cast Iron specimen using Metallurgical Microscope.	10. Identification of microstructure of Grey and Nodular iron	MEF310.2
6	Identify the Microstructure of the given White and Malleable Cast Iron specimen using Metallurgical Microscope.	11. Identification of microstructure of White and Malleable Cast iron	MEF310.2
7	Perform Annealing and normalizing of the given steel sample and identify changes in properties.	 Carry out annealing and normalizing Selecting temperatures and time using diagram Identify changes in microstructures 	MEF310.3
8	Perform hardening process of the given steel sample and measure the change in hardness using hardness tester.	 15. Carry out hardening 16. Selecting temperatures and time using diagram 17. Identify changes in microstructures 18. Hardness testing 	MEF310.3
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9	Identify the Microstructure of the given Non-ferrous metal specimen (Any 2) using Metallurgical Microscope.	19. Identification of microstructure of Non- ferrous metals	MEF310.4
10	Detect surface flaws of the given component using penetrant test and Magnetic particle inspection method.	20. Detecting surface flaws using penetrant and Magnetic particle test	MEF310.5

G) INDUSTRIAL EXPOSURE :

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

- a. Follow safe practices
- b. Practice good housekeeping
- c. Practice energy conservation
- d. Maintain tools and equipment
- e. Follow ethical practices

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

j) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Developmentor	Operating Skills	10
rsychomotor	Drawing / drafting skills	10
Affactiva	Discipline and punctuality	10
Anecuve	Decency and presentation	10
	50	

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Introduction to Physical	S.H. Avner	Tata McGraw Hill Education
	Metallurgy		ISBN 978-00-746-3006-8
2.	Material Science and	V. D. Kodgire	Everest publishing House
	metallurgy		ISBN 81 86314 008
3.	Engineering Material	C. P. Sharma	PHI publication
			ISBN 978-81-203-2448-0
4.	Engineering Materials	B. K. Agrawal	Tata Mcgraw Hill
			ISBN 978-00-745-1505-1
5.	Material Science and	O. P. Khanna	Dhanpat Rai and sons
	metallurgy		ISBN 978-81-899-2831-5
	Material Science for	R. K. Rajput	S K Katariya and sons.
	Polytechnic		ISBN 81-85749-10-8

b) Websites

- a. http://vimeo.com/32224002
- b. www.substech.com/dokuwiki/doku.php?id=iron-carbon_phase_diagram
- c. www-g.eng.cam.ac.uk/mmg/teaching/typd/
- d. www.ironcarbondiagram.com/
- e. uk.ask.com/web?q=Who+Discovered+Carbon%3Fandqsrc=14097ando=41 647924andl=dir
- f. www.youtube.com/watch?v=cN5YH0iEvTo
- g. www.youtube.com/watch?v=m9l1tVXyFp8
- h. www.sakshat.ac.in/

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COURSE ID :	
Course Name	: POLLUTION CONTROL
Course Code	: MEF311
Course Abbreviation	: FPCL

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <nil > Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	04

Evaluation Scheme :

Modo of	Progressiv	ve Assessment	Term End H		
Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	 25 marks for each practical One PST of 25 marks 	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25	125

RATIONALE :

Pollution of air, water, noise etc has become a great problem and headache to all human being and nature due to more and more industrialization. The subject aims at providing students the knowledge of Pollution, various pollutants, their effects, sampling & analysis, pollution control techniques, emission standards etc. This knowledge is essentially required for technicians to look after the pollution control acts requirement & operation of pollution control systems for clean environments.

COMPETENCY

Apply the knowledge of Pollution control to reduce their effects on lives and environment.

Cognitive:Understand the causes of Pollution, various pollutants, pollution control techniques, emission standards.

Psychomotor:Collect sample & analyze it using pollution measuring apparatus.

Affective :Attitude of i) safety ii) punctuality iii)Pollution norms and acts.

COURSE OUTCOMES:

MEF311-1 Analyse causes of air pollutions and its effect on environment.
MEF311-2Identify various causes of water pollution and its control
MEF311-3Recognize level of noise pollution and its prevention & control.
MEF311-4 Apply waste water treatment techniques to control pollution
MEF311-5 Selectpollution control method.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

Competency		Programme Outcomes Pos and PSOs										
and Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	Basic	Discipli	Experime	Engineeri	The	Environm	Ethics	Individu	Commu	Life-	Worki	Start
	knowle	ne	nts and	ng Tools	engineer	ent and		al and	nication	long	n Mfg.	entrepre
	dge	knowle	practice		and	sustainabi		team		learning	&	neurial
		dge			society	lity		work:			Service	activity
-								-			sector	
Competency		_	_			3	2		_	_		
:						5	-					
MEF311-1	-	-	-	-	-	3	2	-	-	-	-	-
MEF311-2	-	-	-	-	-	3	2	-	-	-	-	-
MEF311-3	-	-	-	-	-	3	2	-	-	-	-	-
MEF311-4	-	-	-	-	-	3	2	-	-	-	-	-
MEF311-5	-	-	-	-	-	3	2	-	-	-	-	-

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": No correlation]

CONTENT : H) THEORY :Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluatio n (Marks)
Course (Dutcome MEF311-1 Understand causes of air pollutions and its effect	on	
environ	nent.		
1	AIR POLLUTION	05	12
	1.1 Environment, Ecosystem		
	1.2 Classification of pollution & pollutants		
	1.3Classification, sources & effects of air pollution		
	1.4 Meteorological factors influencing air pollution		
	1.5 Sampling & analysis of air pollutants		
Course (Dutcome MEF311-2Identify various causes of water pollution and its of	control.	
2	WATER POLLUTION	06	16
	2.1 Classification, sources & effects of water pollution	00	10
	2.2 Important terms used in water pollution: Dissolved		
	Oxygen, Chemical oxygen demand, Biological oxygen		
	demand, Theoretical oxygen demand, Total solids, Total		
	suspended solids, Total dissolved solids		
	Turbidity, alkalinity, acidity		
	2.3 Sampling & analysis of water pollutants		
	2.4 Water quality standards		
Course (Dutcome MEF311-3Recognize level of noise pollution and its preventic	on &	•
control.			
3	NOISE POLLUTION	02	06
	3.1 Sources & effects of noise pollution	V 2	
	3.2 Measurement of noise pollution		
	3.3 Prevention & control of noise pollution		
	*		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluatio n (Marks)			
Course (Dutcome MEF311-1 Understand causes of air pollutions and its effect	on				
environ	ment.					
4	GLOBAL POLLUTION	03	06			
	4.1 Green- house effect					
	4.2 Acid rain					
	4.3 Ozone depletion problem					
	4.4 Thermal Pollution and Radiation Pollution					
	Total	16	40			
Semester	Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks elletted should be used to attempt questions of the should elletted marks only.					

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outco	lution.		
5	 WASTE WATER TREATMENT 5.1 Preliminary treatment. Primary treatment. Secondary treatment 5.2 Tertiary treatment, Sludge treatment & disposal 	04	08
Course Outco	me MEF311-5 Apply pollutions control methods and describe polluti	on control a	ects.
6	 HAZARDOUS WASTE 6.1 Defining hazardous waste. Treatment & disposal of hazardous waste 6.2 Hazardous waste management 6.3 Solid Waste: Classification of solid wastes. Ultimate disposal 6.4 Solid waste management. Methods of solid waste disposal, Reuse, Recycling & Recovery of materials from refuse 	06	08
7	POLLUTION CONTROL METHODS 7.1Air pollution control methods for: Gaseous pollutants, Particulate pollutants 7.2 Emission Standards Cane sugar, Distilleries, Textile and Foundry Industry (Block diagram treatment)	03	16
Course Outco	me MEF311-5 Apply pollutions control methods and describe polluti	on control a	ects.
8	ENVIRONMENT & POLLUTION CONTROL ACTS 8.1 Problems of Pollution, Justification of Environment	03	08

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Act		
	8.2 Noise, Air and Water Acts		
	Total	32	80
Semester end e marks allotted a	xam question paper should be such that total marks of questions on each top bove but the candidates are able to attempt questions of the above allotted m	oic is one and arks only.	half times the

Specification table for setting question paper for semester end theory examination :

Торі		Distribution of	ve level-wise)	Course	Total	
c No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Marks
1	Air Pollution	04	04	04	MEF311-1	12
2	Water Pollution	04	06	06	MEF311-2	16
3	Noise Pollution	02	02	02	MEF311-3	06
4	Global Pollution	02	02	02	MEF311-3	06
5	Waste Water Treatment	02	04	02	MEF311-4	08
6	Hazardous Waste	02	02	04	MEF311-5	08
7	Pollution Control Methods	04	04	08	MEF311-5	16
8	Environment & pollution control Acts.	04	04	_	MEF311-5	08
TOTAL		24	28	28		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B.TERM WORK Practical Exercises and related skills to be developed :

Sr.	L aboratory experience				
no	Laboratory experience				
1	Estimation of Suspended Particulate Matter				
2	Analysis of CO, CO ₂ , SO ₂ by using Orsat's Apparatus				
3	Exhaust Gas Analysis of Automobiles.				
4	Determination of turbidity of given Sample				
5	Water Analysis				
	Determination of total dissolved solids, suspended solids in given				
	sample.				
	Determination of Dissolved Oxygen in given sample.				
	Determination of Biological Oxygen Demand in given sample.				

	Determination of Chemical Oxygen Demand in given sample.
	Determination of Acidity and Alkalinity in given water sample.
6	Measurement of sound by Sound level meter.
7	Visit the nearby industries and prepare the report on Pollution Control devices and Equipment.

INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Industrial visits	Waste Water Treatment Plant
2.	Industrial Expert Lecture	Topic in curriculum

ASSESSMENT CRITERIA FOR TERM WORK.

k) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 25			
Cognitivo	Understanding	05			
Cognitive	Application	05			
Psychomotor	Operating Skills/Presentation	10			
Affective	Discipline and punctuality	05			
	TOTAL				

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted.

Final marks of term work shall be awarded as per Assessment norms in Pro-forma III.

C.INSTRUCTIONAL STRATEGIES: Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources:

- 1. Chalk board
- 2. Item Bank
- 3. Power point presentation

REFERENCE MATERIAL:

a) Books:

Sr. No.	Author	Title
1.	B S N Raju	Fundamentals of Air Pollution
2.	P Venugopala Rao	Environmental Engineering
3.	C S Rao	Environmental Pollution Control
		Engineering
4.	C Jamnadas	Environmental Law

b) Websites

1) www.deanza.edu/bhes/StudentHandbook.pd

2) www.lib.berkeley.edu/BIOS/tutor.htm
3) www.southampton.ac.uk/library/infoskills/tutorials.html

* * *

COURSE ID:

Course Name	: NON- CONVENTIONAL ENERGY SOURCES
Course Code	: MEF312
Course Abbreviation	: FNCE

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : Nil Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	04

Evaluation Scheme :

Modo of	Progressiv	ve Assessment	Term End Examination				
Figure of	Theory	Prostical	Theory	Torm Work	Oral	Total	
Evaluation	Theory	Flactical	Examination		Examination		
Details of Evaluation	Average of two tests of 20 marks each	i) 25 marks foreach practicalii) One PST of25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	_		
Marks	20		80	25		125	

RATIONALE:

Energy is an important aspect in all sectors of country's economy. The energy crisis is mainly caused due to increased population and enhanced standard of living and life style of people. The conventional sources of energy are insufficient to meet these demands. Hence, alternative energy sources are utilized for power production. The use of alternate energy sources is increasing day by day. Diploma engineers are expected to develop, operate and maintain these systems. It is therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.

COMPETENCY

Identify and use renewable energy as an alternative energy source.

Cognitive: Understand importance and scope of various non-conventional energy.

Psychomotor: Practice various non-conventional energy conversion equipment.

Affective :Attitude of i) safety ii) punctuality iii)Pollution norms and acts. iv)Environment sustainability.

COURSE OUTCOMES:

MEF312-1Develop awareness for effective utilization of Non-Conventional Energy sources.

MEF312-2 Describe different components of wind energy machines and their functions.

MEF312-3 Recognize the scope of biogas plant.

MEF312-4Identify various Non-conventional energy sources for energy conservation.

MEF312-5Apply energy conservation technique and principles of energy management in Industrial sectors.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": No correlation]

Competency		Programme Outcomes Pos and PSOs										
and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowled ge	PO 3 Experime nts and practice	PO 4 Engineeri ng Tools	PO 5 The engineer and society	PO 6 Environm ent and sustainabi lity	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Workin Mfg. & Service sector	PSO 2 Start entrepr eneuria l activity
Competency	2	-	-	-	1	3	2	-	-	-	-	2
MEF312-1	1	-	-	-	1	3	2	-	-	-	-	1
MEF312-2	1	-	-	-	1	3	2	-	-	-	-	1
MEF312-3	1	-	-	-	1	3	2	-	-	-	-	1
MEF312-4	1	-	-	-	1	3	2	-	-	-	-	1
MEF312-5	1	-	-	-	1	3	2	-	-	-	-	1

CONTENT : A. THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluati on (Marks)
Course (Dutcome MEF312-1 Develop awareness for effective utilization of Non-Conv	entional	
	Energy sources.		
1	SOLAR ENERGY	06	20
	1.1 Major Sources of Energy: Renewable and Non-renewable.		-
	1.2 Need and Prospectus of Alternate Energy Sources		
	1.3 Solar radiation Geometry: Declination, hour		
	Angle, Altitude angle, incident angle, Zenith		
	angle, solar Azimuth angle		
	1.4 Instruments for measuring solar radiation		
	1.5 Construction and working of typical flat plate		
	collector, solar concentrating collector and their		
	applications, Advantages and Limitations		
	1.6 Solar Photo voltaic Electric Conversion		
	1.7 Solar pond, solar electric power generation, Solar		
	Cooking and furnace.		

Course (Dutcome MEF312-2 Describe components of wind energy m/c and its Functi	ons.	
2.	WIND ENERGY	06	12
	2.1 Principle of Wind energy conversion, Nature of		
	the Wind energy.		
	2.2 Power in wind, Power coefficient, Maximum		
	power, Wind Energy Conversion		
	2.3 Selection of site for wind mill.		
	2.4 Classification of WEC systems.		
	2.5 Advantages and limitations of WECS		
	2.6 Basic components of WECS.		
	2.7 Wind energy collectors- Horizontal and Vertical		
	axis machines,		
	2.8 Safety systems and Environmental aspects		
Course (Dutcome MEF312-3 Recognize the scope of biogas plant.		
3	BIO-MASS ENERGY	04	08
	3.1 Biomass conversion technologies - 1) combustion		
	2) Thermo chemical 3) Biochemical		
	Wet processes, Dry processes.		
	3.2 Biogas generation – anaerobic digestion,		
	3.3 Types of Bio-gas plants, KVIC Digester,		
	Deenbhandu, Pragati Biogas plant.		
	3.4 Materials used for biogas generation. Selection of		
	site for biogas plant. Applications.		
Semester	end exam question paper should be such that total marks of questions on each topic	is one and ha	alf times the
marks allo	otted above but the candidates are able to attempt questions of the above allotted mark	s only.	

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluati on (Marks)
Course	Outcome MEF312-4 Identify various NC energy sources for energy conserva	tion.	
4	 ENERGY FROM THE OCEANS 4.1 Ocean Thermal Electric Conversion-Methods of Power Generation, Open and closed cycle OTEC system 4.2 Tidal power –Basic Principle, Components of Tidal Power Plants, 4.3 Operation Methods-single basin and double basin 4.4 Advantages and limitations for tidal power Generation 4.5 Sites Requirements. 	04	08
Course	Outcome MEF312-4 Identify various NC energy sources for energy conservati	on.	
5	OTHER ALTERNATE SOURCES OF ENERGY 5.1 Geothermal Energy –Sources, Principle, Geothermal energy power plant, Advantages , Limitation & application of Geothermal Energy. 5.2 Small Hydroelectric Plant(Mini and Micro hydel):	06	16

Section II

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluati on (Marks)
	Nature, Classification of SHPstation, Components of		
	SHP, Advantages and Limitation of SHP		
	5.3 Fuel Cell- Principle of Operation, Classification,		
	Advantages, Limitation and Application of Fuel cell		
	5.4 Magneto-Hydro Dynamic(MHD) PowerGeneration-		
	Principles, MHD system, Advantages, Future Prospects		
Course	Outcome MEF312-5 Apply energy conservation technique and principles of a	energy	
manage	ment in Industrial sectors.		
6	ENERGY CONSERVATION AND MANAGEMENT	06	16
	6.1 Energy scenario in various sectors and Indian Economy.		-
	6.2 Need and importance of energy conservation and management.		
	6.3 Concept of payback period, Return on		
	Investment (ROI), Life cycle cost, Sankey diagrams,		
	Specific Energy consumption		
	6.4 Principle and methods of energy conservation		
	6.5 Energy Audit and its types.		
	6.6 Co-generation and its Application		
	6.7 Waste Heat Utilization		
	6.8 Concept and Technique of energy management		
	Total	32	80
Semeste marks al	r end exam question paper should be such that total marks of questions on each topic	is one and ha	alf times the

Specification table for setting question paper for semester end theory examination :

Tonio		Distribution o	Caunda	Total		
No.	Name of topic	Remember	member Understand		Outcome	Marks
1	Solar Energy	10	04	06	MEF312-1	20
2	Wind Energy	04	04	04	MEF312-2	12
3	Bio-Mass Energy	04	02	02	MEF312-3	08
4	Energy From the Oceans	02	04	02	MEF312-4	08
5	Other Alternate Sources of Energy	08	04	04	MEF312-4	16
6	Energy Conservation and Management	04	04	08	MEF312-5	16
TOTAL		32	22	26		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B.TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work in practical sessions of batches of about 22 students:

Sr	Title of Practical Exercise	Skills / Competencies to be	Course
No.		developed	Outcome
1)	Demonstration on solar flat plate collector	Use and working of Solar flat plate	MEF312-1
	used for water heating.	collector.	
2)	Demonstration on working of photo voltaic	Use and working of Photo voltaic	MEF312-1
	cell.	cell.	
3)	Demonstration on working of solar cooker.	Using the solar cooker.	MEF312-1
4)	Visit to Mini and Micro hydel power plant.	Awareness to hydel power plant	MEF312-4
5)	Visit to solar heating system/ wind power	Awareness of solar heating system/	MEF312-1
	plant.	wind power plant.	
6)	Demonstration of construction and working	Use and working of wind mill.	MEF312-2
	of horizontal axis wind mill or to visit a		
	nearest wind farm.		
7)	Demonstration of a biogas plant or	Use and working of Biogas plant.	MEF312-3
	visit a biomass/ biogas plant of municipal		
	waste.		
8)	Case study on Energy Audit.	Suggest the methods of energy	MEF312-5
		saving	

C.INDUSTRIAL EXPOSURE:

SN	Mode of Exposure	Торіс
1.	Industrial Visits	Wind Energy and Biomass Energy
2.	Industrial Visits	Solar heating system

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 25
Comitivo	Understanding	05
Cognitive	Application	05
Psychomotor	Operating Skills/Presentation	10
Affective	Discipline and punctuality	05
	TOTAL	25

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations

- 3. Power Point presentations4. Item Bank

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Dr B.H.Khan	Non conventional energy Resources	Tata McGraw Hill
2.	G. D. Rai	Non conventional energy sources	Khanna publication
3.	S. P. Sukhatme	Solar energy	Tata McGraw Hill
4.	H. P. Garg	Solar energy	Tata McGraw Hill
5.	Arora	Power plant engineering	Dhanpat Rai & Co.
6.	Arora and	Power plant engineering	Dhanpat Rai & Co.
	Domkundwar		
7	P.H. Henderson	India- The energy sector	Oxford University Press
8	D. A. Ray	Industrial energy conservation	Pergaman Press
9	W. C. Turner	Energy management handbook	Wiley Press

b) Websites

i)<u>www.mahaurja.com</u> ii) <u>www.indiasolar.com</u> iii)<u>www.beeindia.in</u>

* * *

COURSE ID:

Course Name	: HIGHER MATHEMATICS
Course Code	:MEF313
Course Abbreviation	: FHMT

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Applied Mathematics

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	04
Tutorial	02	04

EVALUATION SCHEME :

	Progressive Asses	sment	Ter	m End	Total	
	Theory	Practical	Theory	Practical	Total	
Component			Term			
Details and			End			
Duration	Average of two tests of 20 marks each	Assignment	Theory			
		s given by	Exam			
		teacher	(03			
			hours)			
Marks	20	25	80		125	

RATIONALE:

Mathematics is an important pre-requisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of Mathematics is an effective tool to pursue and to master the applications in the engineering and technological fields. The connection between Higher Mathematics and its applications in real life can be understood and appreciated. Finite Differences helps in finding population ,temperature of a city etc . Laplace Transform is used to solve ordinary differential equations .

COMPETENCY:

The course should be taught and implemented with the aim to develop the following qualities

1.Cognitive:understanding ,remembering and applying principles of mathematics to engineering problems

2. **Psychomotor**: To prepare difference table ,to compute interpolation ,extrapolation and missing values in engineering data

3. Attitude: discipline, consistency, hard work, to concentrate ,accuracy, punctuality, aesthetics

COURSE OUTCOMES(CO's)

The student will be able to:

MEF 313.1 Apply methods of finite differences to Engineering and technical field

MEF 313.2Apply rules and methods of partial differentiation to solve Engineering and technical Problems **MEF 313.3**To equip student with tools of Laplace transform and Linear Differential equations with constant coefficients to enable him to use in Engineering and technology

MEF313.4 To equip students with the techniques of solving Linear differential equations with constant coefficients

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

					Program	nme Outco	omes POs	and PSO	s			
Competency and COs	PO 1 Basic knowledge	PO 2 Disciplin e knowledg e	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Working Mfg. & Service sector	PSO 2 Start entrepre neurial activity
Competency:	1	1	-	1	-	-	-	-	-	-	-	-
MEF313.1	1	1	-	1	-	-	-	-	-	-	-	-
MEF 313.2	1	1	-	1	-	-	-	-	-	-	-	-
MEF 313.3	1	1	-	1	-	-	-	-	-	-	-	-
MEF 313.4	1	1	-	1	-	-	-	-	-	-	-	-

CONTENT:

Section I

Sr. No.	Topics / Sub-topics	Lectur es (Hours	Theory Evaluatio n
MEF 313	.1 Apply methods of finite differences to Engineering and technical fie	eld	
1	 1 FINITE DIFFERENCE Finite differences, forward differenceΔ, Backward differences ∇ ,Operator E and Difference tables. 1.1 Inverse of E, Δ,∇, 1.2 Factorial notations of polynomials 1.3 To find missing terms by using difference table 1.4 Newton's forward & backward differences interpolation formulae (Examples) 1.5 Lagrange's interpolation formula for unequal intervals.(Examples) 	12	20

MEF 313. 2 Apply rules and methods of partial differentiation to solve Engineering and technical Problems

H. THEORY :

2	 2 PARTIAL DIFFERENTIATION 2.1 Partial Derivatives of first order (Definition, Examples) 2.2 Partial Derivatives of higher Order (Definition, Examples) 2.3 Homogeneous functions, Euler's theorem on homogeneous functions (Examples) 2.4 Jacobians (Definition, Examples) 	12	20
	Total	24	40
1.Semes	ter end exam question paper should be such that total marks of question	ns on each	topic is one

and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

2.In each topic corresponding applications will be explained

Sr. No.	Topics / Sub-topics	Lectur es (Hours)	Theory Evaluatio n (Marks)
MEF 31	3.3 To equip student with tools of Laplace transform and Linear Differ	rential equa	ations with
constant	coefficients to enable him to use in Engineering and technology		
3	3 LAPLACE TRANSFORM		
	3.2 Laplace Transforms of Standard functions		
	3.3 First shifting property		
	3.4 Examples on Multiplication by t		
	3.5 Examples on Division by t	12	20
	3.6 Inverse Laplace Transform, Definition		
	3.7 Standard formulae (Examples)		
	3.8 Inverse L.T.by using First shifting property		
	3.9 Inverse L.T. by using Partial fraction method,		
	3.10 Inverse L.T. by using Convolution theorem		
	3.11Applications of Laplace transforms		
	3.12 to solve differential equation using Laplace Transform		
MEF312 constant	3.4 To equip students with the techniques of solving Linear differential coefficients	equations	with

Section II

Sr. No.	Topics / Sub-topics	Lectur es (Hours)	Theory Evaluatio n (Marks)
4	 4.LINEAR DIFFERENTIAL EQUATION WITH CONSTANT COEFFICIENTS 4.1 Definition, Operator D, Inverse of D 4.2 To find C.F.(Only) of L.D.E. When i)roots are real and equal, ii)Roots are real and unequal iii) Roots are Imaginary and a pair of equal imaginary roots 	12	20
	Total	24	40
1.Sem and ha allotte	ester end exam question paper should be such that total marks of question alf times the marks allotted above but the candidates are able to attempt d marks only.	ons on each t questions	topic is one of the above

2.In each topic corresponding applications will be explained

Specification table for setting question paper for semester end theory examination:

Tonio		Distribu	Total			
No.	Name of topic	Knowledge Comprehensio n		Application	Marks	
1	Finite Differences	4	6	10	20	
2	Partial Differentiation	4	6	10	20	
3	Laplace Transform	4	6	10	20	
4	L.D.E. With constant coefficients	4	6	10	20	

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

I. PRACTICALS.

Note: Practicals are to be used to get enough practice [One batch for 20 Students]

Sr No.	Торіс	Tutorial Content (10 problems in each tutorial)
1	Finite Differences	To evaluate examples on operators as E , Δ, ∇ and Factorial notation
2	Finite Differences	To evaluate Newton's forward & backward differences interpolation formulae

3	Finite Differences	To evaluate Lagrange's interpolation formulae
4	Partial Differentials.	To evaluate Partial Derivatives of higher Order Homogeneous functions,
5	Partial Differentials.	To evaluate examples on Euler's theorem on homogeneous functions, Jacobian's
6	Laplace transform	Examples on first shifting property ,Multiplication by tn Property, Division by t property
7	Laplace transform	Examples on inverse L.T. by Partial fraction method
8	L.D.E. With constant coefficient	Examples on Different types of C.F.
9	L.D.E. With constant coefficient	Examples on Different types of C.F.

INSTRUCTIONAL STRATEGIES: Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Tutorials

Teaching and Learning resources:

- 1. Chalk board
- 2. Item Bank
- 3 Formulae Charts
- 4 Power point presentation

REFERENCE MATERIAL:

a) Books:

Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	Engineering Mathematics III	Phadake Prakashan,
			Kolhapur
2.	P.N. Wartikar	Applied mathematics	Pune vidyarthi Griha
			Prakashan, pune
3	H.K. Dass	Higher engineering mathematics	S .Chand publication
4	B.S.Grewal	Higher engineering Mathematics	Khanna publication,
			New Delhi

b) Websites

- i) <u>www.khanacademy.org</u>
- ii) <u>www.easycalculation.com</u>
- iii) www.math-magic.com

LEVEL – IV APPLIED TECHNOLOGY COURSES

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COURSE ID:

Course Name	: POWER ENGINEERING
Course Code	:MEF401
Course Abbreviation	:FPEG

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s)

: MEE302 Thermal Engineering

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	00

Evaluation Scheme :

	Progressiv	ve Assessment	Term I			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral examin ation (Ext)	Total
Details of Evaluation	Average of two tests of 20 marks each	 25 marks for each practical One PST of 25 marks 	Term End Theory Exam (03 hours)	As per Proforma-III	As per Profor ma-I	
Marks	20		80		25	125

RATIONALE :

Engines have vital role in human life. Today's fast lifestyle of human is complimented in great proportion by engine started from steam engine. Presently steam engine are dominated by IC engines. IC engines are used for so many application in practices, which makes our life handicap without them. Therefore knowledge of various parts, working, testing maintenance etc. of IC engine, its pollution control and studies is became necessary. Next generation of IC engine is gas turbine which also has application in air transport and power generation. Hence knowledge of basic cycle and theoretical aspect involved is necessary. Almost every industries, garages etc. requires an air compressor for various applications hence knowledge of air compressor is essential. Diploma engineer should understand the fundamentals of refrigeration and air- conditioning as there are many industrial applications and also many entrepreneual opportunities in this field.

COMPETENCY :

Analyse performance of power producing and power absorbing devices **Cognitive :**Identify various parts and understand the function of I.C.Engines **Psychomotor :**Conduct trial on I. C. Engine and air compressor to analyze performance **Affective :**Attitude of i) Analytic thinking ii) Safety iii) Punctuality

COURSE OUTCOMES:

MEE401.1Define fundamental aspects of Internal Combustion(I.C.) Engine **MEE401.2** Describe the working principles of different types of I.C. Engines and its systems MEE401.3 Estimate the performance of I. C. Engines conducting trial

MEE401.4 Compute various parameters concerning I. C. Engine

MEE401.5 Describe other work producing and work absorbing contrivances

MEE401.6 Interpret working and construction of heat engines, Refrigerator & air conditioners

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

		Programme Outcomes POs and PSOs										
Competency and Cos	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experime nts and practice	PO 4 Engineeri ng Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individua l and team work	PO 9 Communi cation	PO 10 Life- long learning	PSO1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competenc y:	-	2	-	-	1	2	-	-	-	2	-	2
MEE401-1	-	2	-	-	1	2	-	-	-	2	-	2
MEE401-2	-	2	-	-	1	2	-	-	-	2	-	2
MEE401-3	-	2	-	-	1	2	-	-	-	2	-	2
MEE401-4	-	2	-	-	1	2	-	-	-	2	-	2
MEE401-5	-	2	-	-	1	2	-	-	-	2	-	2
MEE401-6	-	2	-	-	1	2	-	-	-	2	-	2

CONTENT :

I) THEORY:

	Section 1		
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluati on (Marks)
Course	OutcomeMEE401.1 Define fundamental aspects of Internal Combustion(I.C	C.) Engine	
	MEE401.2 Describe the working principles of different types of	I.C. Engin	es and its
	systems	0	
1	INTERNAL COMBUSTION ENGINE	16	20
-	1.1 Classification of IC engines	20	
	1.2 Various terms of engines: Bore, Stroke, Dead centers, Compression ratio,		
	Piston displacement, Piston speed		
	1.3 Power cycles: Otto, Diesel, Dual, Rankine cycle, Representation on P-V and		
	T-S diagram, Derivation on Otto and Diesel cycle, Simple numerical on Otto and diesel cycle		
	1.4 Two stroke & four stroke engines: Construction, Working, Comparison,		
	Valve timing diagram and Turning moment diagram		
	1.5 Brief description of IC engine combustion stages (SI & CI), Scavenging,		
	Pre-ignition, detonation, supercharging, Turbo charging		
	1.6 List of fuels, Lubricants, Additives and their advantages		
	1.7 Location, Functioning and Materials of various parts of engine.		
Course	Outcome MEE401.3 Estimate the performance of I. C. Engines conducting	trial	
MEE4	101.4 Compute various parameters concerning I. C. Engine		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluati on (Marks)
Cours	e OutcomeMEE401.1 Define fundamental aspects of Internal Combustion(I.C	C.) Engine	
	MEE401.2 Describe the working principles of different types of	I.C. Engin	es and its
	systems		
2.	IC ENGINE SYSTEM, TESTING AND POLLUTION CONTROL IC engine system: Construction and Working of 2.1 Carburetion system (Principle and simple carburettor) 2.2 CI engine fuel injection system 2.3 Ignition system (Battery and Magneto) 2.4 Lubrication system (Principles of Lubrication) 2.5 Cooling system (Air and Water Cooling) Engine Testing: 2.6 Indicated Power, Brake Power, Mechanical, Thermal, Relative and Volumetric Efficiency, BSFC. (Simple Numerical) 2.7 Morse and Motoring test 2.8 Heat Balance sheet and performance curves (Simple Numerical) Pollution Control: 2.9 Pollutants in exhaust gases of SI and CI engines and their Environmental Effects 2.10 Pollution measurement 2.11 Methods of controlling pollutants 2.12 Standard norms of pollution control: Bharat Stage I,II,III,IV and Euro I, II,	16	20
	Total	32	40
Semest	ter end exam question paper should be such that total marks of questions on each topic is one above but the candidates are able to attempt questions of the above allotted marks only.	and half time	es the marks

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluati on (Marks)		
Course Outc	omeMEE401.5 Describe other work producing and work absorbing co.	ntrivances			
3	AIR COMPRESSORS	12	14		
	3.1 Classification				
	3.2 Terminology: Pressure ratio, Compressor capacity, Free Air delivered,				
	Swept volume				
	3.3 Industrial use of compressed air				
	Reciprocating Compressor:				
	3.4 Construction & working of single and two stage reciprocating				
	compressor				
	3.5 Equation of work done (Simple Numerical)				
	3.6 Efficiency: Volumetric, Isothermal and Mechanical (Simple				
	Numerical)				
	3.7 Intercooler, Advantages of multistage compressor Rotary				

Compressors: 3.8 Construction and working of Roots blower, Vane blower, Screw- Types: Oil Flooded, Oil Free, Centrifugal and Axial flow Compressors (No Numerical) 3.9 Methods of Energy saving in Compressors Course OutcomeMEE401.5 Describe other work producing and work absorbingcontrivances 4 GAS TURBINES AND JET PROPULSION Gas Turbines: 4.1 Classifications, Applications 4.2 Constant volume and Constant pressure gas turbines: Closed and Open cycle with their comparisons 4.3 Methods to improve thermal efficiency: regeneration, Intercooling, Reheating using T-Ø diagram (No numerical) Jet Propulsion: 4.4 Principles of Turbo jet, Turbo Propeller, Ram jet 4.5 Rocket propulsion: Solid propellants, Components of liquid propellants and liquid propellant, Components of liquid propellants and liquid propellant, Components of liquid propellants and liquid propellant, Components of plate engines, Refrigerator & air conditioners 10 16 5 REFRIGERATION AND AIR- CONDITIONING Refrigeration 5.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle 5.3 Subcooling and superheating, representation on p-h, T-S diagrams. 5.4 Basic components of Vapour Compression refrigeration and location. Simple vapour absorption refrigeration system. 5.5 Applications- Water cooler, Domestic refrigerator, Ice plant & cold storage. Psychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart &psychrometric processe-sensenble heeting/cooling, humidification, dehumidification, evaporative cooling. Air conditioning systems 5.7 Definition and classification of Air conditioning Systems. 5.8 Construction and working of Window air conditioner and split air conditioner 32	Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluati on (Marks)
Course OutcomeMEE401.5 Describe other work producing and work absorbingcontrivances 4 CAS TURBINES AND JET PROPULSION 06 10 Gas Turbines: 4.1 Classifications, Applications 4.2 Constant volume and Constant pressure gas turbines: Closed and Open cycle with their comparisons 4.3 Methods to improve thermal efficiency: regeneration, Intercooling, Reheating using T-Ø diagram (No numerical) 1et Propulsion: 4.4 Principles of Turbo jet, Turbo Propeller, Ram jet 4.5 Rocket propulsion: 4.5 Rocket propulsion: Solid propellants, Components of liquid propellants and liquid propellant rocket 10 16 Course Outcome MEE401.6 Interpret working and construction of heat engines, Refrigerator & air conditioners 5 REFRIGERATION AND AIR- CONDITIONING Refrigeration n, coefficient of performance. 10 16 5.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle 5.3 Subcooling and superheating, representation on p-h, T-S diagrams. 5.4 Basic components of Vapour Compression Cycle, their function and location. Simple vapour absorption refrigerator, Ice plant & cold storage. Psychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart & & & & & & & & & & & & & & & & & & &		Compressors: 3.8 Construction and working of Roots blower, Vane blower, Screw- Types: Oil Flooded, Oil Free, Centrifugal and Axial flow Compressors (No Numerical) 3.9 Methods of Energy saving in Compressors		
4 GAS TURBINES AND JET PROPULSION Gas Turbines: 4.1 Classifications, Applications 4.2 Constant volume and Constant pressure gas turbines: Closed and Open cycle with their comparisons 4.3 Methods to improve thermal efficiency: regeneration, Intercooling, Reheating using T-Ø diagram (No numerical) Jet Propulsion: 4.4 Principles of Turbo jet, Turbo Propeller, Ram jet 4.5 Rocket propulsion: 4.4 Principles of Turbo jet, Turbo Propeller, Ram jet 4.5 Rocket propulsion: 6.5 ReFRIGERATION AND AIR- CONDITIONING Refrigeration 5.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle 5.3 Subcooling and superheating, representation on p-h, T-S diagrams. 5.4 Basic components of Vapour Compression System. 5.5 Applications- Water cooler, Domestic refrigerator, Ice plant & cold storage. Psychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart &psychrometric processes-sensible heating/cooling, humidification, dehumidification, evaporative cooling. Air conditioning systems 5.7 Definition and classification of Air conditioning Systems. 5.8 Construction and working of Window air conditioner and split air conditioner 32 40	Course Outc	omeMEE401.5 Describe other work producing and work absorbingcom	ntrivances	
4 Gas Turbines: 00 10 Gas Turbines: 4.1 Classifications, Applications 4.2 Constant volume and Constant pressure gas turbines: Closed and Open cycle with their comparisons 4.3 Methods to improve thermal efficiency: regeneration, Intercooling, Reheating using T-Ø diagram (No numerical) Jet Propulsion: Jet Propulsion: 4.4 Principles of Turbo jet, Turbo Propeller, Ram jet 4.5 Rocket propulsion: Solid propellants, Components of liquid propellants and liquid propellant rocket Course Outcome MEE401.6 Interpret working and construction of heat engines, Refrigerator & air conditioners 10 16 5 REFRIGERATION AND AIR- CONDITIONING Refrigeration cycle 10 16 6.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle, their function and location. Simple vapour absorption refrigerator, Ice plant & cold storage. 10 16 9.5 Applications- Water cooler, Domestic refrigerator, Ice plant & cold storage. 9xychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart & gsychrometric processes-sensible heating/cooling, humidification, dehumidification, evaporative cooling. 32 40 Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks	1	GAS TURBINES AND JET PROPULSION	06	10
state conditioners 5 REFRIGERATION AND AIR- CONDITIONING Refrigeration 10 16 S Refrigeration 5.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle 5.3 Subcooling and superheating, representation on p-h, T-S diagrams. 5.4 Basic components of Vapour Compression Cycle, their function and location. Simple vapour absorption refrigeration system. 5.5 Applications- Water cooler, Domestic refrigerator, Ice plant & cold storage. 10 10 Psychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart &psychrometric processes-sensible heating/cooling, humidification, dehumidification, evaporative cooling. 4i 4i Air conditioning systems 5.7 Definition and classification of Air conditioning Systems. 5.8 Construction and working of Window air conditioner and split air conditioner 32 40 Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks 50 50	Course Outc	 Gas Turbines: 4.1 Classifications, Applications 4.2 Constant volume and Constant pressure gas turbines: Closed and Open cycle with their comparisons 4.3 Methods to improve thermal efficiency: regeneration, Intercooling, Reheating using T-Ø diagram (No numerical) Jet Propulsion: 4.4 Principles of Turbo jet, Turbo Propeller, Ram jet 4.5 Rocket propulsion: Solid propellants, Components of liquid propellants and liquid propellant rocket ome MEE401.6 Interpret working and construction of heat engines, Reference of the second second	efrigerator	& air
5 REFRIGERATION AND AIR- CONDITIONING Refrigeration 10 16 Seffrigeration 5.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle 5.3 Subcooling and superheating, representation on p-h, T-S diagrams. 5.4 Basic components of Vapour Compression Cycle, their function and location. Simple vapour absorption refrigeration system. 5.5 Applications- Water cooler, Domestic refrigerator, Ice plant & cold storage. Psychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart &psychrometric processes-sensible heating/cooling, humidification, dehumidification, evaporative cooling. 4 Air conditioning systems 5.7 Definition and classification of Air conditioning Systems. 5.8 Construction and working of Window air conditioner and split air conditioner 5.8 Censtruction and working of Window air conditioner and split air conditioner 32 40		conditioners		
Total3240Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks	5	 REFRIGERATION AND AIR- CONDITIONING Refrigeration 5.1 Tonnes of Refrigeration, coefficient of performance. 5.2 Vapour compression system, Vapour compression refrigeration cycle 5.3 Subcooling and superheating, representation on p-h, T-S diagrams. 5.4 Basic components of Vapour Compression Cycle, their function and location. Simple vapour absorption refrigeration system. 5.5 Applications- Water cooler, Domestic refrigerator, Ice plant & cold storage. Psychrometry 5.6 Properties of moist air-DBT, WBT, DPT, Specific humidity and relative humidity, Dalton's law of partial pressure psychrometric chart &psychrometric processes-sensible heating/cooling, humidification, dehumidification, evaporative cooling. Air conditioning systems 5.7 Definition and classification of Air conditioning Systems. 5.8 Construction and working of Window air conditioner and split air conditioner 	10	16
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks		Total	32	40
	Semester end	exam question paper should be such that total marks of questions on each topic is one	and half time	es the marks

Specification table for setting question paper for semester end theory examination :

Topi Name of topic Distribution of marks (Cognitive level-wise) Course Total	Total
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c No.		Remember	Understand	Applica- -tion	Outcome	Mark s
1	Internal combustion engine	08	08	04	MEE401.1 MEE401.2	20
2	IC engine system, Testing and Pollution control	08	08	04	MEE401.3 MEE401.4	20
3	Air compressors	04	06	04	MEE401.5	14
4	Gas turbines And Jet Propulsion	04	04	02	MEE401.5	10
5	Refrigeration and air conditioning	06	06	04	MEE401.5	16
TOTAL		30	32	18		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

J) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual* developed by the Institute in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Dismantling and assembling of Petrol / Diesel four stroke Engines	To identify and understand the function of various component of I. C. Engines.	MEE401.1 MEE401.2
2	Demonstration of various engine systems.	To observe and understand the function of various engine systems.	MEE401.1 MEE401.2
3	Trial on Petrol and Diesel engine with Heat Balance sheet	To analyze the performance of Engine.	MEE401.3 MEE401.4
4	Visit to Diesel/Petrol engine manufacturing plant	To understand practically working of Diesel/ Petrol engine manufacturing plant. To study the Exhaust gas analysis at engine testing department	MEE401.1 MEE401.2
5	Trial on air compressor	To develop ability to analyze the performance of an air compressor.	MEE401.5
6	Visit to gas turbine power plant	To understand practically working of gas power plant.	MEE401.5
7	Trial on Refrigeration Test Rig for calculation of power consumed, refrigerating Effect, C.O.P.	To develop ability to analyze the performance of refrigeration system	MEE401.5

ſ	8	Trace the flow of refrigerant through	To understand practically	
		various components in window air	working of air conditioner	MEE401.5
		conditioner/		

K) INDUSTRIAL EXPOSURE : Included in experiment no. 4 & 6.

L) ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given in *Proforma-I*

Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Proforma-I*

Term-end Oral Examination (External) :

Term-end Oral Examination (External) shall be conducted as per the following criteria:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	3
2	Preparedness for oral	5
3	Correct figures / diagrams	5
4	Observation tables	5
5	Result table / calculations / graphs	5
6	Safety / use of proper tools	2
		25

Final Assessment of Termwork / Oral Examination shall be done as per Pro-forma I.

M) INSTRUCTIONAL STRATEGIES : Instructional Methods :

- a. Lectures cum Demonstrations
- b. Classroom practices

Teaching and Learning resources :

- N) Chalk board
- O) LCD presentations
- P) Audio presentations
- Q) Item Bank

F. REFERENCE MATERIAL : a)

Books

Sr. No.	Author	Title	Publisher
1.	Patel &Karamchandani	Heat Engine vol II & III	Acharya Publication
2.	Kumar Vasandani	Heat Engineering	Metropolitan

3.	Mathur Sharma	Course in IC Engines	DhanpatRai
4.	V Ganeshan	IC Engine	Mc-Graw Hill

b) Websites <u>http://freevideolectures.com/Subject/Mechanical</u>

http://www.grc.nasa.gov

http://www.wartsila.com

http://www.engihub.com

http://www.air-compressor-guide.com

COURSE ID:

Course Name	: MACHINE DESIGN
Course Code	: MEF402
Course Abbreviation	: FMDN

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : MEF305

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme :

	Progressiv	ve Assessment	Term End Examination			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	i.25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	As per Proforma-I	
Marks	20		80	-	25	125

RATIONALE:

Machine design consists of application of scientific principles, technical information and imagination for the development of a new or improved mechanical system to perform specific function with maximum efficiency and economy.

This needs students to know load analysis, stress analysis and material properties. They should also be familiar with various mechanical elements, their design method and selection, use of design data book or manufacturers catalogue.

COMPETENCY:

Design and draw simple machine elements.

Cognitive: Apply design procedure to components under different failure modes

Psychomotor : Draw assembly and detailed drawing of designed components

Affective :Attitude of i) Analytical thinking ii) safety iii) punctuality iv) Use of design handbook

COURSE OUTCOMES:

MEF402-1 Select material and design stress for different types of loading in component

MEF402-2 Analyse the stress and identify failure modes for mechanical components

MEF402-3 Use concepts, procedure and decision analysis techniques required to design

MEF402-4 Apply different aspects of design process for product design

MEF402-5 Design simple machine elements

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO1 Work in mfg& service sector	PSO 2 Start entrepr eneurial activity
Competen cy:	-	3	-	-	-	-	-	2	-	-	2	-
MEF402-1	-	3	-	-	-	-	-	2	-	-	2	-
MEF402-2	-	3	-	-	-	-	-	2	-	-	2	-
MEF402-3	-	3	-	-	-	-	-	2	-	-	2	-
MEF402-4	-	3	-	-	-	-	-	2	-	-	2	-
MEF402-5	-	3	-	-	-	-	-	2	-	-	2	-

CONTENT:

A. THEORY :

Section-I

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
Cou	rse Outcome MEF402-1: Select material and design stress for different types	s of loading ir	n component
1	 INTRODUCTION 1.1 Mechanical engineering design- steps involved in design process 1.2 Aesthetic consideration in design. 1.3 Ergonomic consideration in design. 1.4 Use of standards in design. 1.5 Selection of preferred sizes. 	04	06
<i>Course Outcome MEF402-1:</i> Select material and design stress for different types of loading in component			n component
2	 ENGINEERING MATERIALS 2.1 Stress: strain diagram of ductile & brittle material. Modes of failure, factor of safety. 2.2 Selection of materials. 2.3 Casting materials: gray C.I., white C.I., and malleable C.I. 2.4 Plain carbon steel alloy steel and its BIS designation 	03	04

-				
Course OutcomeMEF402-2 : Analyse the stress and identify failure modes for mechanical components				
	DESIGN AGAINST STEADY LOADING			
	3.1 Normal stress- strain.			
	3.2 Shear stress -strain.			
2	3.3 Stress due to bending and torsion moment.			
3	3.4 Principal stresses.	06	12	
	3.5 Theories of failure: max normal stress theory, max shear stress			
	theory, distortion energy theory.			
	3.6 Design of cotter and knuckle joint.			
Сог	<i>Course OutcomeMEF402-3:</i> Use concepts, procedure and decision analysis techniques required to design			
	DESISN OF POWER SCREWS			
	4.1 Introduction, application, form of threads,			
	4.2 Torque required to lift and lower the screw and efficiency of screw			
4	threads and overall efficiency, self locking of screw			
4	4.3 Stresses in screws	08	10	
	4.4 Collar frictional torque			
	4.5 Design of screw jack, C-clamp, vices.			
	(analytical treatment for square threads only)			
<i>Course OutcomeMEF402-3:</i> Use concepts, procedure and decision analysis techniques required to design				
	DESIGN OF FASTNERS AND THREADED CONNECTIONS			
	5.1 Threaded joints, Advantages of Threaded joint, ISO metric screw			
	threads.			
	5.2 Basic types of screw fastening and bolts of uniform strength			
5	5.3 Bolted connection- external load in tension, calculation of	03	08	
	Resultant bolt load.			
	5.4 Preload on bolt and its torque requirements.			
	to axis of bolt			
1		1	1	

Section-II

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks	
	Course OutcomeMEF402-4: Apply different aspects of design process for	product des	ign	
6	 DESIGN AGAINST VARIABLE LOADING 6.1 Fluctuating stresses, fatigue failure, S-N diagram, endurance limit. 6.2 Stress concentration, Stress concentration factors, reduction in stress. 6.3 Concentration effects, notch sensitivity. 6.4 Soderberg and Goodman diagram. 	02	04	
	<i>Course OutcomeMEF402-4:</i> Apply different aspects of design process for product design			
7	 DESIGN OF SHAFTS, KEYS, AND COUPLINGS 7.1 Introduction of shaft, Determination of shaft diameter subjected to torsional and bending moment. 7.2 Design of shaft for torsional rigidity. 	06	12	

	7.3 Types of keys, design of square and flat keys.		
	7.4 Types of coupling, Design of rigid coupling		
	Course OutcomeMEF402-5 Design simple machine element	uts	
8	MECHANICAL SPRINGS		
	8.1 Types of spring, Applications of springs.		
	8.2 Helical springs: Stress equation.	0.6	10
	8.3 Helical springs: deflection equation.		10
	8.4 Series and parallel connection of springs		
	8.5 Spring materials, styles of end.		
	Course OutcomeMEF402-5 Design simple machine element	nts	
9	SPUR GEARS		
	9.1 Advantages of Gear drive.		
	9.2 Types of gears, Nomenclature of spur gear teeth.	06	08
9.3 Standard systems of gear tooth.		00	00
9.4 Force analysis of spur gears.			
	9.5 The Lewi's formula, Dynamic load in spur gears.		
	Course OutcomeMEF402-5 Design simple machine element	its	
10	ROLLING CONTACT BEARINGS		
	10.1 Types of rolling contact bearings.		
	10.2 Static load carrying capacity.		
	10.3 Dynamic load carrying capacity.		
	10.4 Bearing load, Load-Life relationship.	04	06
	10.5 Procedure for selection of bearing for single row deep groove ball bearing.		
	10.6 Lubrication and mounting of bearings.		
	10.7 Sliding contact bearing: Modes of lubrication, Bearing materials		
Sem	ester end exam question paper should be such that total marks of questions on	each topic is	one and half
time	s the marks allotted above but the candidates are able to attempt questions of	the above al	lotted marks
only			notion marks
1 only	•		

Specification table for setting question paper for semester end theory examination :

Торі	Nome of tonic	Distribu	tion of marks (level-wise)	Course	Total Mork	
No.	Name of topic	Remembe r	Understand	Applica- -tion	Outcome	S
1	Introduction.	04	02	00	MEF402-1	06
2	Engineering materials.	01	02	01	MEF402-1	04
3	Design against steady loading.	04	06	02	MEF402-2	12
4	Design of power screws.	02	02	06	MEF402-3	10
5	Design of fasteners and threaded connections.	02	02	04	MEF402-3	08

6	Design against variable loading.	02	02	00	MEF402-4	04
7	Design of shafts, keys, and couplings.	04	04	04	MEF402-4	12
8	Mechanical springs.	04	04	02	MEF402-5	10
9	Spur gears	02	04	02	MEF402-5	08
10	Rolling contact bearings	02	02	02	MEF402-5	06
TOT AL		27	30	23		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B.TERM WORK

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr. No.	Laboratory experience	Skills developed	Course Outcome
	List of Experiments:	Students will acquire the skills of	MEF402-1 to
	Term work should consist of any	selecting the material, selecting the	MEF402-5
	five assignments including design	factor of safety, finalizing the	
	and working drawing of mechanical	permissible stresses by use of	
	elements. (project is compulsory).	design data and with given loading	
	1) Design of cotter joint or	to make a decision regarding the	
	knuckle joint	dimensions of the loaded	
	2) Design of power screw	components.	
1	3) Design of threaded connection		
1	4) Design of coupling		
	5) Design of springs		
	6) Design of project		

C. INDUSTRIAL EXPOSURE:

Included in experiment no. 6

FOR TERM WORK AND PRACTICAL EXAMINATION

- a) Continuous Assessment of Practical Assignments : Every practical assignment shall be assessed for 25 marks as per criteria given in *Proforma-I*
- b) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted as per criteria given in Proforma-I

c) Term-end Oral Examination (External) :

Term-end Oral Examination (External) shall be conducted as per the following criteria:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	5
2	Preparedness for practical	5

3	Correct figures / diagrams	5
4	Design calculations.	5
5	Result table / calculations / graphs	5
		25

Final Assessment of Oral Examination shall be done as per Pro-forma I.

E. INSTRUCTIONAL STRATEGIES:

- 1) Lectures and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources, including references:

- 1) Chalk-board.
- 2) Demonstrative kits.
- 3) Demonstrative charts.
- 4) Audio video aids through PPT
- 5) Animated videos

F. REFERENCE MATERIAL:

a) Books

Sr. No	Author	Title	Publisher
01	B.V. Bhandari	Machine Design	MGH
02	Khurmi –Gupta	Machine Design	MGH
03	PSG	Design Data Book	PSG
04	Shigely	Machine Design	Pearson

b) Websites : http://www.mhhe.com/bhandari/dme3e

* * *

COURSE ID:

Course Name	: ADVANCE MACHINING PROCESSES
Course Code	: MEF403
Course Abbreviation	: FAMP

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <nil >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	00

Evaluation Scheme :

Mode of	Progressiv	ve Assessment	Term End H		
Evaluation	Theory Practical		Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	 25 marks for each practical One PST of 25 marks 	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25	125

RATIONALE :

This is an applied technology course. Due to the technological development, manufacturing processes are advancing fast. This subject will provide basic insight in the students to look to various problems on the shop floor. After getting conversant with the basic production processes, it is necessary for a diploma holder to know about the advancements in the area of production and manufacturing processes. The course will provide knowledge and skills necessary for working in modern manufacturing environment .This course will help to the students to study working principles and operations performed on milling machines, gear cutting, transfer machines, non-conventional machining processes, CNC machines& maintenance of machine tools.

COMPETENCY :

Programming and simulation of simple mechanical component using CNC machines

Cognitive : Understand various advance machining processes.

Psychomotor : i) Cut gear on milling machine.

ii) Write a part program and simulate it.

Affective : Develop attitude of i) Accuracy ii) Safety iii) Precision iv) Build programming logic

COURSE OUTCOMES :

MEF403-1 Classify, Specify and perform operations on milling machine.

MEF403-2 Select various gear manufacturing methods and cut gear.

MEF403-3 Select non conventional machining processes.

MEF403-4 Write a part program and simulate it.

MEF403-5 Prepare maintenance schedule for machine tools.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

Competency	Programme Outcomes POs and PSOs											
and Cos	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO 1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competency:	-	2	3	3	-	-	-	2	-	-	2	-
MEF403-1	-	2	3	3	-	-	-	2	-	-	2	-
MEF403-2	-	2	3	1	-	-	-	2	-	-	2	-
MEF403-3	-	2	2	1	-	-	-	2	-	-	2	-
MEF403-4	-	2	2	2	-	-	-	2	-	-	2	-
MEF403-5	-	2	3	3	-	-	-	2	-	-	2	-

ONTENT :

R) THEORY :

	Section 1							
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)					
Course (Dutcome							
MEF403	5-1 Classify, Specify and perform operation on milling machine.							
1	MILLING PROCESS	06	16					
	1.1Classification							
	1.2Basic parts and their functions – column and knee type							
	1.3Specifications of milling machines							
	1.4 Milling cutters, Cutter nomenclature							
	1.5 Types of operations : Up milling, Down milling, Plain							
	milling, Side and face milling, Form milling, Gang							
	milling. End milling, Face milling, T- slot milling,							
	Slitting							
	1.6 Work holding devices							
MEF403	-2 Select various gear manufacturing methods and cut gear.	·						
2.	GEAR MANUFACTURING	04	10					
	2.1Gear Cutting: Indexing, Indexing Methods							
	2.2Gear Hobbing							
	2.3Gear Shaping : Principle, Advantages and							
	disadvantages							
	2.4Gear Finishing Processes : Shaving, Grinding,							
	Burnishing, Lapping							

Sr. No.	Topics / Sub-topics		Theory Evaluation (Marks)					
Course (Course Outcome							
MEF403	B-1 Classify, Specify and perform operation on milling machine.							
Course (<i>Dutcome</i> MEF403-4 Select non conventional machining processes.							
3	NON CONVENTIONAL MACHINING PROCESSES:	06	14					
	3.1Classification							
	3.2Electro discharge machine (EDM) : Construction,							
	Working Principle, Applications and Advantages &							
	disadvantages.							
	3.3Wire cut EDM : Construction, Working principle,							
	Applications, Advantages & Disadvantages.							
	3.4Electro chemical machining (ECM):							
	Construction, Working principle, Applications and							
	Advantages & Disadvantages.							
	3.5Laser beam machining (LBM):							
	Construction, Working principle, Applications and							
	Advantages & Disadvantages.							
	3.6Electron beam machining(EBM):							
	Construction, Working principle, Applications and							
	Advantages & Disadvantages.							
	Total	16	40					
Semester end exam question paper should be such that total marks of questions on each topic is one and half								
times the marks allotted above but the candidates are able to attempt questions of the above allotted marks								
only.								

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
Course	Outcome MEF403-4Write a part program and simulate it.				
4	CNC MACHINES	03	08		
	Introduction :				
	4.1 Basic components of Numerical Control System				
	4.2 Parts suitable for CNC machine				
	4.3 Horizontal, Vertical and Universal Machining Centre – Principal				
	Parts				
Course	Outcome MEF403-4Write a part program and simulate it.	•			
5	Classification of NC/CNC machines	03	08		
	5.1 Classification : Based on Feedback control, Based on				
	control				
	5.2 Methods of listing co-ordinates : Absolute co-				
	ordinate system, Incremental co-ordinate system.				
Sr. No.		Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)	
------------	----------------------	---	---------------------	---------------------------------	
	5.3 Axis i	dentification in CNC machines : Linear axis,			
	Rotary	y axis.			
Cours	se Outcome N	IEF403-4 Write a part program and simulate it.			
6	FUNAME	ENTALS OF PART PROGRAMMING.	0 9 5	122	
	6.1	Objectives, NC words			
		Rapid Transverse Function (G00),			
		Liner Interpolation Function			
		(G01), Circular Interpolation Function (G02)/(G03),			
	Dwell Function (G04)				
		Programming Formats.			
	6.3	Writing a part programming			
	6.4	Point to point machining.			
		Part programming for machining straight line.			
		Machining along straight Line.			
		Lathe Operations.			
	6.5	Programming for CNC milling machine			
		Tooling for CNC. Canned cycles.			
		Do loop, subroutine.			
Cours	se Outcome N	IEF403-5 Prepare maintenance schedule for machine tools.			
7	MAINT	TAINANCE OF MACHINE TOOLS:	05	05 12 12	
	7.1 Need,	Importance & Types			
	7.2 Basic	maintenance practices : For Bearings,			
	Coupli	ngs,			
	7.3 Pulley	s and shafts			
	7.4 Repair	r cycle analysis			
	7.5 Mainte	enance records			
	7.6 House	keeping.			
	7.7 Introdu	action to Total Preventative Maintenance (TPM)			
	Total		16	40	
Semes	ster end exam	question paper should be such that total marks of questions of	on each topic i	s one and half	
times	the marks all	otted above but the candidates are able to attempt questions	of the above	allotted marks	

only.

Specification table for setting question paper for semester end theory examination :

Topio		Distribution	of marks (Cogniti	ve level-wise)	Course	Total
No.	Name of topic	Remember	Understand	Applica- -tion Outcome		Marks
1	Milling Machines	04	06	06	MEF403-1	16
2	Gear Manufacturing	02	04	04	MEF403-2	10

3	Non Conventional	04	04	06	MEE/03-3	1/
5		04	04	00	WILI 405-5	14
	Machine					
	Process					
4	CNC Machines	04	02	02	MEF403-4	08
5	Classification of NC	04	02	02	MEF403-4	08
	/ CNC					
	Machines					
6	Fundamentals of	04	04	04	MEF403-4	12
	part programming					
7	Maintenance of	04	04	04	MEF403-5	12
	Machines					
	TOTAL	26	26	28		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only. **TERM WORK**

Practical Exercises and related skills to be developed :

The following practical	exercises shall	be conducted as	Term Work.
01			

Sr. No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	One job on gear blank turning , drilling & Facing	To know the outer diameter, width, turning, facing, keyway & drilling	MEF403-2
2	Any one Job on gear cutting/milling keyway/grooves/slots/end milling	To know & develop gear cutting methods and slot cutting on milling machines.	MEF403 -2
3	Five CNC programming on CNC Lathe & VMC Machines having operations turning, step turning, face milling, slotting, counter machining (Group of two students, each group must use software for different dimensions)	To Program & use of basic concepts of programming of CNC lathes & VMC Machines.	MEF403-4
4	Demonstration of producing one component on CNC production lathe machine (Batch of 4 to 6 students)	To know & understand the basic operating system of CNC production lathe machine	MEF403 –4
5	One assignment of part programming on machining center	To understand & develop part programming on machining centers	MEF4034
6	One assignment on EDM, ECM, LBM, EBM.	To develop construction, working and applications of non conventional machining methods	MEF403-3

7	On assignment on maintenance of Machine Tools	To prepare maintenance record / History cards, basic maintenance procedure for bearing & coupling	MEF-403-5

INDUSTRIAL EXPOSURE :

S. N.	Mode of Exposure	Торіс
1.	Field Visit	Covering theory
2.	Field examples of course application	Term-work assignment

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

l) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Davahomotor	Operating Skills	10
Psycholiotor	Drawing / drafting skills	10
Affastiva	Discipline and punctuality	10
Allective	Decency and presentation	10
	TOTAL	50

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES : Instructional Methods :

- 1. Lectures
- 2. Demonstrations during practicals
- Teaching and Learning resources :
 - 1. Chalk board
 - 2. LCD presentations

Reference Books :-

Author	Title	Publisher
S. K. Hajra Chaudhary,	Elements of workshop Technology -	Media Promoters and
Bose, Roy	Volume I & II	Publishers limited
B.S. Raghuvanshi	Elements of workshop Technology -	Dhanpat rai& Sons
	Volume I & II	
R. K. Jain	Production Technology	Khanna Publication New
		Delhi
Production Technology	Hindustan Machine Tools (HMT)	Tata Publication

b) Websites

1)<u>http://nptel.ac.in</u>

2)www.egr.msu.edu/~pkwon/me478

3)www.basicmechanicalengineering.com/lathe~machine~operation~basic:turning.operations

4)<u>www.planomillers.com/drilling.machine.html</u>

5)www.jsw.co.in/en/products/injectionmoulding 6)http://www.opm.gov/fedclass/fws3869.pdf

7)www.swikuo.com

8)<u>www.workshopmachiery.com</u>

9)www.thomasnet.com

10)www.sodick.com

* * *

COURSE ID:

Course Name	:PROJECT-I
Course Code	:MEF 404
Course Abbreviation	: FPRJ

TEACHING & EVALUATION SCHEME:

Pre-requisite Course(s) : <*nil* >

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	-	02
Practical	02	02

Evaluation Scheme :

	Progressiv	ve Assessment	Term End Examination			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	As per Proforma-I	
Marks				25	-	25

Note: Four week Vacational Industrial training is compulsory after completion of IVth semester.

(Exposure to industries during vacational training will help to generate different ideas for project work.)

Rationale:

Most of the engineering activities fall within the category of pre-project preparation i.e. seminar requiring individual or group decisions, variety of solutions. The purpose of providing seminar in the curriculum is to expose the students to such situations so that they can gain confidence in taking decisions and taking their problem on their own. The emphasis on the project work must shift from teacher centered to student-centered activities and the creative ability of the student to come forward.

A technician should be able to effectively communicate ideas. Proper group functioning is a prerequisite for maximizing output from a problem- solving group in work environment. The students are able to work effectively in a group and thus gain confidence to take up responsibilities in their careers.

COMPETENCY

Develop innovative and creative ideas and check their feasibility for project work.

Cognitive :1. Idea generation

2. Selection of feasible idea

3. Apply project management techniques

Psychomotor :Survey and prepare pre-project seminar report

Affective :Attitude of i) Safety ii) Punctuality iii) Self expression/Communication iv) Analytical

Thinking v) Interpersonal relation vi) Team work

COURSE OUTCOMES:

MEF404-1: Identify, analyze & define the problem

MEF404-2: Develop alternative solutions to the problem identified

MEF404-3: Compare & select feasible solutions from alternatives generated

MEF404-4: Prepare detailed feasibility report

MEF404-5: Apply different work scheduling techniques

MEF404-6: Develop and present pre-project seminar report

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

		Programme Outcomes POs and PSOs										
Competenc y and Cos	PO 1 Basic knowl edge	PO 2 Discipl ine knowle dge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The engine er and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work	PO 9 Comm unicati on	PO 10 Life- long learni ng	PSO1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competenc y:	-	-	-	-	-	-	-	3	2	-	1	2
MEF404-1	-	-	-	-	-	-	-	3	2	-	2	3
MEF404-2	-	-	-	-	-	-	-	3	2	-	2	3
MEF404-3	-	-	-	-	-	-	-	3	2	-	1	3
MEF404-4	-	-	-	-	-	-	-	3	2	-	1	2
MEF404-5	-	-	-	-	-	-	-	3	2	-	1	3
MEF404-6	-	-	-	-	-	-	-	3	2	-	1	3

A. CONTENT

Components of Pre Project Report:

- 1. Project Summary (One page summary of entire project)
- 2. Introduction (Promoters, Market Scope/ requirement)
- 3. Project Concept & Product (Details of product)
- 4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
- 5. Manufacturing Process & Technology
- 6. Plant & Machinery Required
- 7. Location & Infrastructure required
- 8. Manpower (Skilled, unskilled)
- 9. Raw materials, Consumables & Utilities
- 10. Working Capital Requirement (Assumptions, requirements)
- 11. Market (Survey, Demand & Supply)
- 12. Cost of Project, Source of Finance
- 13. Projected Profitability & Break Even Analysis
- 14. Conclusion

Project-I Seminar

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Max. 4 students per batch)

2. Each project batch should select topic / problem / work by consulting the guide & / or

industry. Topic / Problem / work should be approved by Head of department.

3. Each project batch should prepare action plan of project activities & submit the same to respective guide.

4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities .

5. Action Plan should be part of the project report.

Seminar Report:

- 1. Every project group shall prepare & deliver the seminar. Evaluation of seminar will be carried out by
- 2. Panel of at least three teaching staff from mechanical department.
- 3. Selection of topic for the seminar should be finalized in consultation with teacher guide allotted for the batch to which student belongs.
- 4. Seminar report should be of min.10 & max. 20 pages & it should be certified by guide teacher and head of the department.

: 2 to 3 minutes /student.

- 5. for presentation of seminar, following guide lines are expected to be followed:
 - a) Time for presentation of seminar : 7 to 10 minutes /student.
 - b) Time for question/answer
 - c) Evaluation of seminar should be as follows:
- d) Use of audio visual aids or power point presentation is desirable.
- 6. Topic of the seminar should not be from diploma curriculum
- 7. Seminar shall be based on tentative topic of project such as review paper on some specific well defined area/ specialized stream of mechanical engineering.

ASSESSMENT CRITERIA FOR ORAL/PRACTICAL:

Assessment of project-I work shall be assessed according to following criteria:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	03
2	Market survey	02
3	Project concept	05
4	Presentation of seminar/Oral	05
5	Participation in work and understanding level	10
	Total	25

Assessment shall be done as per Proforma-III.

Instructional strategies:

- 1) Guidance and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

COURSE ID:

Course Name	:PROJECT- II
Course Code	: MEF405
Course Abbreviation	:FPRJ

TEACHING & EVALUATION SCHEME:

Pre-requisite Course(s) : MEF404 PROJECT- I **Teaching Scheme:**

Scheme component	Hours / week	Credits
Theory	-	04
Practical	04	04

Evaluation Scheme :

	Progressiv	ve Assessment	Term			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practicalii. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-I	
Marks				25	50	75

Note: Two week Vacational Industrial training is compulsory after completion of Vth semester. (Exposure to industries during vacational training will help to execute project work.)

Rationale:

In practice the diploma technicians come across problems of varied nature. He/she will haveto solve the problems involving drawings, designs, manufacturing, installation, testing andMaintenance of machines. In order to cultivate the systematic methodology for problem solvingusing acquired technical knowledge & skills, this particular subject is introduced. This subject will also help to enhance the generic skills & professional skills.

COMPETENCY

Design and develop a working model of machines.

Cognitive: Apply design theory and project management principles to design and develop a machine

Psychomotor:Fabricate/Manufacture/Assemble machine parts and demonstrate its working

Affective: Attitude of i) Safety ii) Punctuality iii) Self-expression/Communication iv) Analytical

Thinking v) Interpersonal relation vi) Team work

COURSE OUTCOMES:

MEF404-1: Identify, analyze & define the problem

MEF404-2: Generate alternative solutions to the problem identified

MEF404-3: Compare & select feasible solutions from alternatives generated

MEF404-4: Design various machine components

MEF404-5: Assemble various machine parts and demonstrate its working

MEF404-6: Prepare a detailed project report

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX: [Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

	Programme Outcomes POs and PSOs											
Competenc y and COs	PO 1 Basic knowl edge	PO 2 Discipl ine knowle dge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The engine er and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work	PO 9 Comm unicati on	PO 10 Life- long learni ng	PSO1 Work in mfg& service sector	PSO 2 Start entrep reneur ial activit y
Competenc y:	-	-	-	-	-	-	-	3	2	-	1	2
MEF404-1	-	-	-	-	-	-	-	3	2	1	2	3
MEF404-2	-	-	-	-	-	-	-	3	2	-	2	3
MEF404-3	-	-	-	-	-	-	-	3	2	-	1	3
MEF404-4	-	-	-	-	-	-	-	3	2	-	1	2
MEF404-5	-	-	-	-	-	-	-	3	2	-	1	3
MEF404-6	-	-	-	-	-	-	-	3	2	-	1	3

A. Content:

Following activities related to project are required to be dealt with, during this semester.

- 1. Form project groups of max. 4 students in each group.
- 2. Each project groupshall work on the problem identified in project-I by consulting the guide or industry.
- 3. Topic / Problem / work shall be approved by guide and Head of department.
- 4. Each project batch shall prepare action plan of project activities & submit the same to respective guide.
- 5. Mid-term evaluation of project work shall be done by departmental evaluation committee.
- 6. At the end of semester, each project batch shall submit the project report and project.

Components of Project Report:

- 1. Title and cover page
- 2. Declaration
- 3. Certification and/or Industry sponsored project certificate
- 4. Acknowledgement
- 5. Abstract
- 6. Table of contents
- 7. List of figures
- 8. List of tables
- 9. List of symbols and Abbreviations

- 10. Introduction
- 11. Literature review
- 12. Body of Project write-up (Chapterwise)
- 13. Experiments and Results
- 14. Conclusion and Recommendations
- 15. Future Scope
- 16. References

Project report preparation Format:

- 1. Project report shall be printed on white A4 bond paper.
- 2. The text shall have a standard font of Times New Roman of 12 pts. With 1.5 line spacing.
- 3. The printed sheets shall have the following written area and margins

Top margin	: 15mm
Head height	: 3 mm
Head separation	: 12 mm
Bottom margin	: 22 mm
Footer	: 3 mm
Left margin	: 30 mm
Right margin	: 20 mm

- 4. Each chapter shall begin on a fresh page and title shall be printed at the centre of the line in 18 pt in bold using both upper and lower case.
- 5. Heading of the chapter shall have 16 pt in bold and sub-heading shall have 14 pt in bold.
- 6. Project report shall be prepared with following nos;
 - a. One copy for Department
 - b. One copy for project Guide
 - c. One copy each for students in project group
- 7. Project report shall be prepared with hard bound covers with cover page matter in golden embossing printing on front cover.

ASSESSMENT CRITERIA FOR ORAL/PRACTICAL:

i) Continuous Assessment of Project work :

Project work shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 50
Cognitivo	Knowledge	02
Cogintive	Application	03
Developmentor	Operating Skills	10
rsychomotor	ParticularsMarks of Marks of KnowledgeApplication02Application03Operating Skills10Drawing / drafting skills05Discipline and punctuality02Decency and presentation03TOTAL25	05
Affective	Discipline and punctuality	02
Allective	Decency and presentation	03
	TOTAL	25

Assessment shall be done based on Proforma-III.

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Market survey	05
3	Project concept	05
4	Presentation of seminar/Oral	15
5	Participation in work and understanding level	20
	Total	50

ii) Assessment for Project work based on oral examination shall be done as per following criteria:

Assessment shall be done based on *Proforma-I*.

Instructional strategies:

- 4) Guidance and discussions.
- 5) Laboratory experiences and laboratory interactive sessions.
- 6) Time bound assignments.

COURSE ID:

Course Name	: HYDRAULIC MACHINERY
Course Code	: MEF406
Course Abbreviation	: FHYM

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <nil >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	03

Evaluation Scheme :

Modo of	Progressiv	ve Assessment	Term			
Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination	Total
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	-	
Marks	20		80	25	-	125

RATIONALE :

Knowledge of fluid flow & related machinery is essential in all fields of engineering. Hydraulic machines have important role in power generation, water supply and irrigation and also in most of engineering segments. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc. The fundamentals of this subject are essential for the subject "Industrial Fluid Power" in sixth semester.

COMPETENCY: Operation and performance evaluation of hydraulic machines

COMPETENCY: Operation and performance evaluation of hydraulic machines

Cognitive: -Describe basics of fluid mechanics & Working of hydraulic machines **Psychomotor:** Measurement of various fluid parameters and conduct trials on hydraulic machines **Affective:** Attitude of i) Analytical Thinking ii) Safety

COURSE OUTCOMES:

MEF406.1-Classify various types of flows and define fluid properties.

MEF406.2-Measure pressure, velocity, and flow rate by using various measuring instruments.

MEF406.3-Calculate major & minor friction losses, power, efficiency etc., for various systems

MEF406.4-Analyse the effects of Impact of jet on vane in various conditions

MEF406.5- Describe construction & working of different turbines and pumps

MEF406.6-Conduct trial on performance testing of pumps.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowle dge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individua l and team work	PO 9 Commu nication	PO 10 Life- long learnin g	PSO 1 Work in mfg& service sector	PSO 2 Start entrepr eneuria l ativity
Competency	-	3	2	-	-	-	-	-	-	-	1	2
MEF406.1	-	3	-	-	-	-	-	-	-	-	1	1
MEF406.2	-	3	3	-	-	-	-	-	-	-	2	2
MEF406.3	-	3	3	-	-	-	-	-	-	-	2	2
MEF406.4	-	3	-	-	-	-	-	-	-	-	-	1
MEF406.5	-	3	-	-	-	-	-	-	-	-	-	2
MEF406.6	-	3	3	-	-	-	-	-	-	-	2	2

CONTENT :

S) THEORY :

Section I					
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
	Course Outcome MEF406-1 Define fluid pro	operties			
01	 PROPERTIES OF FLUID 1.1 Density, Specific gravity, Specific Weight, Specific Volume 1.2 Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity 1.3 Vapour Pressure, Compressibility 	04	08		
	Course Outcome MEF406-2 Solve numerical related to fluid pu	ressure & m	anometers		
02	 FLUID PRESSURE AND PRESSURE MEASUREMENT 2.1 Fluid pressure, Pressure head ,Pressure intensity, 2.2 Concept of absolute vaccum, gauge pressure, atmospshere pressure, absolute pressure. 2.3 Pressure head mesurement by Piezometer, U -tube manometer, inverted U -tube manometer, and 	08	12		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Bourdon's pressure gauge. 2.4 Concept of total pressure on immersed bodies, center of pressure.		
Co	urse Outcome MEF406-3Measure flow rate by using Venturim	eter Orifice	& Pitot Tube
03	 FLUID FLOW 3.1 Types of fluid flows 3.2 Continuity equation 3.3 Bernoulli's theorem, Reynolds's number. 3.4 Venturimeter: Construction, principle of working, Coefficient of discharge, Discharge through venturimeter. 5.5 Orifice meter: Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter 3.6 Pitot tube: Construction, Principle of Working 	08	12
Co	urse Outcome MEF406-3-Calculate major & minor friction los	sses in flow t	hrough pipes
4	 FLOW THROUGH PIPES 4.1 Laws of fluid friction (Laminar and turbulent) 4.2 Darcy's equation and Chezy's equation for frictional losses. 4.3 Minor losses in pipes 4.4 Hydraulic gradient and total gradient line. 4.5 Hydraulic power transmission through pipe, transmission efficiency water hammer and its effects 	04	08
	Total	24	40
Seme one a the ab	ster end exam question paper should be such that total marks on nd half times the marks allotted above but the candidates are a pove allotted marks only.	of questions able to attem	on each topic is on topic is of

Section 1	[]
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Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Co	ourse Outcome MEF406.4- Analyse the effects of Impact of and itions	f jet on van	e in various
	conailions		
5	IMPACT OF JET	04	06
	5.1 Impact of jet on fixed vertical, moving vertical flat		
	plates.		
	5.2 Impact of jet on curved vanes with special reference to		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	turbines & pumps		
	Course Outcome MEF 406 5- Describe construction & workin	g of differen	t turbines
6	HYDRAULIC TURBINES	<u>10</u>	18
	6.1 Layout of hydroelectric power plant.		
	6.2 Features of Hydroelectric power plant.		
	6.3 Classification of hydraulic turbines.		
	6.4 Selection of turbine on the basis of head and discharge		
	available		
	6.5 Construction and working principle of Pelton wheel,		
	Francis		
	and Kaplan turbine.		
	6.6 Draft tubes: Types and construction, Concept of		
	cavitations		
	in turbines.		
	6.7Velocity diagram for Pelton wheel & Francis turbine.		
	6.8 Calculation of Work done, Power developed losses &		
	different efficiency.		
	Course OutcomeMEF406.6- Conduct trial on performan	ce testing o	f pumps.
7	CENTRIFUGAL PUMPS	05	08
	7.1 Construction , principle of working and applications		
	7.2 Types of casings and impellers.		
	7.3 Concept of multistage		
	7.4 Priming and its methods, Cavitations		
	7.5 Manometric head, Work done, Manometric efficiency,		
	Overall efficiency, NPSH		
	7.6 Performance Characteristics of Centrifugal pumps		
	7.7 Trouble Shooting		
	7.8 Construction, working and applications of submersible,		
	jet pump		
	Course OutcomeMEF406.6- Conduct trial on performan	ce testing o	f pumps.
8	RECIPROCATING PUMP	05	08
	8.1Construction, working principle and applications of		
	single		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	and double acting reciprocating pumps		
	8.2 Concept of Slip, Negative slip, Cavitation and separation		
	8.3 Air Vessels, functions & advantages.		
	8.4 Indicator diagram with effect of acceleration head &		
	frictional head		
	Total	24	40

Specification table for setting question paper for semester end theory examination :

Торі		Distribution	Distribution of marks (Cognitive level-wise)			
c No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Mar ks
1	Properties of Fluids	4	2	2	MEF406.1	8
2	Fluid pressure & its measurement	4	4	4	MEF406.2	12
3	Fluid flow	4	4	4	MEF406.3	12
4	Flow through pipes	2	2	4	MEF406.3	8
5	Impact of Jets	2	2	2	MEF406.4	6
6	Hydraulic Turbines	6	6	6	MEF406.5	18
7	Centrifugal Pumps	2	2	4	MEF406.6	8
8	Reciprocating Pumps	2	2	4	MEF406.6	8
TOT AL		26	24	30		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

T) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual* developed by the Institute in practical sessions of batches of about 22 students :

Sr	Title of Prostical Eversion	Skills / Competencies to be	Course
No.	The of I factical Exercise	developed	outcome
1.		Ability to select and use	MEF406.2
	Use of Pressure measuring devices.	appropriate pressure measuring	
		devices.	
2.	To determine Coefficient of friction for	Ability to use manometer and	MEF406.3
	flow through pipes.	measurement of discharge.	
3.	Triel on contrifuced nump	Measurement of head,	MEF406.6
	mai on cenunugai pump.	calculation of pump efficiency.	
4.	Trial on Reciprocating pump.	Measurement of head,	MEF406.6

		calculation of pump efficiency.	
5.	Demonstration on Palton Wheel	Measurement of head,	MEF406.6
	Demonstration on renon wheel.	discharge, power, efficiency.	
6.	Demonstration on Francis Turbing	Measurement of head,	MEF406.6
	Demonstration on Francis Turbine.	discharge, power, efficiency.	
7.	Maintenance and trouble shooting for	Find out different problems &	MEF406.6
	centrifugal pumps.	remedies for centrifugal pump.	
8.	Industrial visit to Hydro-electric Power	Lay out study and	MEF406.5
	plant & Report.	specifications of turbines	

C. INDUSTRIAL EXPOSURE :

c) As per practical no. 8 an Industrial visit of students to Hydro-Electric Power Plant.

FOR TERM WORK AND PRACTICAL EXAMINATION

d) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given in *Proforma-III* Every Experiment of practical shall be assessed for 25 marks as per criteria given below:

Sr.	Criteria	Marks allotted
No.		
1	Attendance in regular practical	05
2	Correctness in diagram and experiment writing	05
3	Understanding of Experiment	10
4	Safety measures and Proper handling of devices	05
	Total	25

e) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted as per criteria given in Proforma-III

E. INSTRUCTIONAL STRATEGIES:

1) Lectures and discussions.

- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources, including references:

- 6) Chalk-board.
- 7) Demonstrative kits.
- 8) Demonstrative charts.
- 9) Audio video aids through PPT
- 10) Animated videos

RÉFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr.No.	Author	Title	Publisher	
01	R.S. Khurmi	Hydraulic Machinery	S chand.	
02	S.K.Agrawal	Fluid mechanics & machinery.	Tata McGraw Hill	
03	R. K. Bansal	Fluid mechanics & machinery	Tata McGraw Hill	
04	Modi & Seth	Fluid Mechanics	Rajsons	
05	R. K. Rajput	Fluid mechanics & hydraulic machinery	S chand.	

b) Websites) *http://en.wikipedia.org/wiki/Applied_mechanics*

* * *

COURSE ID:

Course Name	:METROLOGY
Course Code	: MEF407
Course Abbreviation	: FMTR

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <nil > Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme:

	Progressi	ve Assessment	Tern			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External))	Total
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	As per Proforma-IV	
Marks	20		80	25		125

RATIONALE :

The mechanical Engineering technician often come across measuring different parameters of machined components and the appropriate fitments of interchangeable components in the assemblies. For the above purpose he/she is also required to analyze the quantitative determination of physical magnitude and ensure the control of quality. During previous semesters different systems of measurement and their units etc have been introduced in the subject, basic physics. The different methods and instruments which can be used for linear and angular measurements, geometrical parameters (like surface finish, Square ness, Parallelism, Roundness etc....) and the use of gauges and system of limits, Fits, Tolerances etc. are often required to be dealt in detail by diploma technician on the shop floor. He/she is also required to analyze, Interpret and present the data collected, graphically & statistically for ensuring the quality. The knowledge of the subject also forms the basis for the design of mechanical measurements systems, design & drawing of mechanical components.

COMPETENCY :

Use various Metrological Instruments.

Cognitive: Interpret terminology of various measuring instruments.

Psychomotor: Measure dimensions of components by selecting proper measuring instrument.

Affective: Develop attitude towards analytical thinking, precision, accuracy, Selection, Safety, care and Precaution of measuring instrument

COURSE OUTCOMES :

MEF407.1-Define the terms related to Metrology.

MEF407.2-Select appropriate measuring instrument.

MEF407.3-Selecttechnique to determine dimensions of components.

MEF407.4-Measure and compare the dimensions of given component using instruments and gauges.

MEF407.5-Interpret various terms related to measuring instruments & components.

MEF407.6- Use Slip gauges to calibrate measuring instruments.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO 2
Competency	Basic	Disciplin	Experi	Enginee	The	Enviro	Ethics	Individua	Commu	Life-	Work in	Start
and	knowled	e	ments	ring	engineer	nment		l and	nication	long	mfg&	entrepr
Cos	ge	knowled	and	Tools	and	and		team		learnin	service	eneuria
		ge	practic		society	sustain		work		g	sector	1 anvity
			e			ability						
		3	3	_	_	_	_	_	_	_	3	_
Competency	_	5	5	-	-	_	_	_	-	_	5	_
MEF407.1	-	1	2	-	-	-	-	-	-	-	3	-
MEE407.2		1	1								2	
MEF407.2	-	I	1	-	-	-	-	-	-	-	3	-
MEF407.3	-	3	2	-	-	-	-	-	-	-	3	-
MEF407.4	-	3	2	-	-	-	-	-	-	-	3	-
MEF407.5	-	3	2	-	-	-	-	-	-	-	3	-
MEF407.6	-	3	2	-	-	-	-	-	-	-	3	-

CONTENT: A.THEORY:

SECTION-I

Sr. No.	Topics / Sub-topic	Teaching (Hours)	Theory Evaluation Marks
Cours	e OutcomeMEF407-1Define the terms related to Metrology.		
1.	 INTRODUCTION TO METROLOGY 1.1 Metrology Basics, Definition of metrology, Categories of metrology, Scientific metrology, Industrial metrology, Legal metrology, Need of inspection, Precision, Accuracy, Sensitivity, Readability, Calibration, Traceability, Reproducibility. 1.2 Sources Of errors, Factors affecting accuracy, Selection Of instrument, Precautions while using an instruments for getting higher precision and accuracy. 	06	10

Course OutcomeMEF407.4- Measure and compare the dimensions of given	component	using
instruments and gauges.	1	0
MEF407.2- Select appropriate measuring instrument.		
2. STANDARDS AND COMPARATORS	06	10
 2.1 Definition and introduction to line standard end standard, Wavelength standard, Slip gauge and its accessories, Length bars. 2.2 Definition, Requirement of good comparator, Classification, use of comparators, Working principle of comparators, Dial indicator, Sigma comparator, Pneumatic comparator, Electrical, Electronic, Relative advantages and disadvantages 		
Course OutcomeMEF407-5 Interpret various terms related to measuring instrument	nts& compo	onent
 3. LIMITS, FITS, TOLERANCES & GAUGES 3.1Concept Of Limits, Fits, And Tolerances, Selective Assembly, Interchangeability. 3.2 Hole And Shaft Basis System, Taylor's Principle, Design Of Plug, Ring Gauges. 3.3 IS919-1993 (Limits, Fits & Tolerances, Gauges IS 3477-1973. concept of multi gauging and inspection 	06	12
Course OutcomeMEF407.4- Measure and compare the dimensions of given	component	using
instruments and gauges.		
 4. ADVANCES IN METROLOGY 4.1 CMM (Coordinate measuring machine)- Introduction, Definition, Various Parts of CMM, Types of CMM, Probing system, Advantages of CMM. Factors for Selection of CMM, Measurement capabilities, CMM design factors. 4.2 Geometric Dimensioning and Tolerancing (GD&T) –Definition, Purpose, Advantages, Importance, Symbols 	06	08
TOTAL	24	40
Semester end exam question paper should be such that total marks of questions on ear	ch topic is or	he and half
times the marks allotted above but the candidates are able to attempt questions of the ab	ove allotted	marks only.

SECTION-II

Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks		
Course OutcomeMEF407.4- Measure and compare the dimensions of given	component	using		
instruments and gauges.				
 SCREW THREAD MEASUREMENT 5.1 ISO grade and fits of thread, Errors in threads, Pitch errors. 5.2 Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch , Two wire method. 5.3 Thread gauge micrometer, Working principle of floating carriage dial 	06	10		
	Topics/Sub-topic Course OutcomeMEF407.4- Measure and compare the dimensions of given instruments and gauges. SCREW THREAD MEASUREMENT 5.1 ISO grade and fits of thread, Errors in threads, Pitch errors. 5.2 Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch , Two wire method. 5.3 Thread gauge micrometer, Working principle of floating carriage dial micrometer	Topics/Sub-topicTeaching (Hours)Course OutcomeMEF407.4- Measure and compare the dimensions of given component instruments and gauges.SCREW THREAD MEASUREMENT5.1 ISO grade and fits of thread, Errors in threads, Pitch errors.5.2 Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch , Two wire method.5.3 Thread gauge micrometer, Working principle of floating carriage dial micrometer		

Sr. No.	Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks
6	GEAR MEASUREMENT AND TESTING	06	10
Ŭ	6.1 Analytical and functional inspection, Rolling test,	00	10
	6.2 Measurement of tooth thickness		
	(constant chord method), gear tooth Vernier,.		
	6.3 Errors in gears such as backlash, runout,		
7	MEASUREMENT OF SURFACE FINISH	06	10
-	7.1Primary and secondary texture, Sampling length, Lay,		_ •
	terminology as per IS 3073- 1967, direction of lay,		
	Sources of lay and its significance.		
	7.2 CLA, Ra, RMS, Rz values and their interpretation,		
	Symbol for designating surface finish on drawing,		
	7.3 Various techniques of qualitative analysis, Working		
	principle of stylus probe type instruments		
C	ourse OutcomeMEF407-5 Interpret various terms related to measuring instru	ments& co	mponent
8	MACHINE TOOL TESTING	04	04
-	8.1Parallelism, Straightness, Squareness, Coaxiallity, roundness, runout		
	8.2 Alignment testing of machine tools as per IS standard		
	Procedure		
Cours	e OutcomeMEF407.6- Use Slip gauges to calibrate measuring instruments		
9	TESTING AND CALIBRATION OF GAUGES.	02	06
-	9.1 Introduction, definition of calibration, importance of		
	Calibration of measuring instruments.		
	9.2 Calibration procedure for general metrological instruments.		
	(Vernier Calliper, Micrometer, Dial Gauges.)		
	TOTAL	24	40
Sen	nester end exam question paper should be such that total marks of questions on each	ch topic is or	ne and half
times	the marks allotted above but the candidates are able to attempt questions of the ab	ove allotted	marks only.

Specification table for setting question paper for semester end theory examination:

Торі	Nome of tonia	Distrib	ution of marks level-wise)	Course	Total	
c No.	Name of topic	Reme mber	Understand	Applica- -tion	Outcome	S S
1	Introduction To Metrology	4	4	2	MEF407-1	10
2	Standards And Comparators.	2	2	3	MEF407-1	10
3	Limits, Fits, Tolerance& Gauges	3	4	4	MEF407-4	12
4	Angular Measurement	2	2	3	MEF407-4	8
5	Screw Thread Measurement	3	2	4	MEF407-3	10
6	Gear Measurement And testing	3	3	4	MEF407-4	10
7	Measurement of Surface Finish	3	2	3	MEF407-3	10

8	Machine Tool Testing.	2	3	3	ME407-3	4
9	Testing And Calibration of Gauges	4	2	4	MEF407-6	6
	Total	26	24	30		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

A. TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work

Sr. No.	Laboratory experience	Skills developed	Course Outcome
1	Linear measuring instruments	Take measurement with Linear	MEF407-2
		measuring instruments	MEF407-4
2	Use of slip gauges	measurement with slip gauges	MEF407-4,
3	Use of mechanical comparators.	Use of mechanical comparators	MEF407-4,
4	Screw thread measurement	To make Screw thread measurement	MEF407-4,
			MEF407-5
5	Study of CMM	To study working of CMM for	MEF407-4,
		measurement.	MEF510-5
6	Surface roughness measurement.	Measurement of Surface roughness.	MEF407-5
7	Demo on Gear parameters	Understanding of gear parameters	MEF407-4
	Measurement.		
8	Tool maker'smicroscope.	Use of Tool makers microscope	MEF407-3,
			MEF407-5
9	Calibration	Calibration of vernier caliper,	MEF510-4,
		micrometer, dial gauge.	MEF510-5

C. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.		

ASSESSMENT CRITERIA FOR TERM WORK

a) Continuous Assessment of Practical :

Every Experiment of practical shall be assessed for 25 marks as per criteria given below:

Sr.	Criteria	Marks allotted
No.		
1	Attendance in regular practical	05
2	Correctness in diagram and experiment writing	05
3	Understanding of Experiment	10
4	Safety measures and Proper handling of devices	05
	Total	25

b)Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given below:

Sr. No.	Criteria	Marks allotted
1	Correctness and understanding	10
2	Preparedness for practical	05
3	Proper Procedure and Workmanship	05
4	Safety measures and Proper handling of devices	05
	Total	25

INSTRUCTIONAL STRATEGIES :

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Computer
- 5. Question Bank

REFERENCE MATERIAL:

1) Books :

Sr.	Author	Title	Publisher
No.			
01	R.K.Jain	Engineering Metrology	Tata McGraw Hill
02	Mahajan	Engineering Metrology	S Chand & Co.
03	J.F.W. Galyer and C. R.	Metrology for Engineers	ELBS
	Shotbolt		
04	K. J. Hume	Engineering Metrology	Kalyani publishers
05	I.C. Gupta	A text book of Engineering	DhanpatRai and
		metrology	Sons,
06	M. Adithan and R. Bahn	Metrology Lab. Manual	T.T.T.I. Chandigarh.

2). IS/ International Codes : IS 919 – 1993 Recommendation for limits, fits and tolerances IS 2029

– 1962 Dial gauges.

IS 2103 – 1972 Engineering Square

IS 2909 – 1964 Guide for selection of fits. I S 2921 –

1964 Vernier height gauges

IS 2949 – 1964 V Block. IS 2984 –

1966 Slip gauges.

IS 3139 – 1966 Dimensions for screw threads. IS 3179

– 1965 Feeler gauges.

IS 3455 – 1966 Tolerances for plain limit gauges. IS 3477

- 1973 Snap gauges.

IS 6137 – 1971 Plain plug gauges. IS 3651 – 1976 Vernier Caliper IS 4218 - Isometric screw threads IS 4440 – 1967 Slip gauges accessories IS 5359 – 1969 Sine bars IS 5402 – 1970 Principle and applications of sine bars IS 5939 – 1970 Sine angles, sine tables.

Websites :

www.mechanical.in/engineering-**metrology**www.nist.gov/iaao/.../SIM-dimensional-**metrology** www.barringer1.com/mil_files/NASA-**Metrology.pdf** www.pmelforum.com/downloads/met-hdbk.

COURSE ID :Course Name: COMPUTER PROGRAMMINGCourse Code: MEE408Course Abbreviation: ECPR

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	2	4
Practical	2	4

Evaluation Scheme :

Mada of	Progressive Assessment		Term End Examination			
Figure 01	Theory	Dractical	Theory	Torm Work	Oral	Total
Evaluation	Theory	Practical	Examination		Examination	
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	_	
Marks	-	-	-	50	-	50

RATIONALE :

This course is designed to develop programming attitude and attract the interest of the students in the C Language .Nowadays almost every set up in Engineering domain chooses C as a basic tool to develop software, so it is useful to study structured and dynamic language like C.

COMPETENCY : Writing Programming of simple arithmetic operation and logical statements.

Cognitive : Understand and write C program

Psychomotor : Write program by using software.

Affective : Attitude of i) Analytical thinking ii) imagination

COURSE OUTCOMES :

MEE408-1 Understand the basic fundamental of C language.

MEE408-2 Able to write simple C program.

MEE408-3 Use if- else , do- while, switch, nested loop and write C program.

 $\ensuremath{\textbf{MEE408-4}}\xspace$ Understand the function , array and develop logic

MEE408-5 Write program by using Structures and Pointers.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepre neurial ativity
Competen cy:	3	3	2	3	3	3	2	3	2	3	3	2
MEE402-1	2	3	2	2	2	2	2	1	1	3	3	1
MEE402-2	2	3	3	1	1	1	1	2	2	3	3	1
MEE402-3	2	3	2	2	1	1	2	1	1	3	3	1
MEE402-4	3	3	2	2	1	1	1	1	1	3	3	2
MEE402-5	3	3	2	3	3	3	2	3	2	3	3	3

CONTENT :

J.THEORY	Section I					
Sr. No.	Topics / Sub-topics	Lectures (Hours)				
COURSE OU	JTCOMES MEE408-1Understand the basic fundamental of C la	nguage.				
1	C FUNDAMENTALS	06				
	1.1History of c					
	1.2 C character set					
	1.3 Identifiers & Keywords,					
	1.4 Data types					
	1.5 Variables					
	1.6 Declarations					
	1.7 Constants					
	1.8 Expressions					
	1.9 C Instructions					
	1.10 The first C program					
	1.11 Compilation & Execution					
COURSE OU	JTCOMESMEE408-2 Able to write simple C program.					
2	OPERATORS& DATA INPUT AND OUTPUT FUNCTIONS	06				

Sr. No.	Topics / Sub-topics	Lectures (Hours)
COURSE O	UTCOMES MEE408-1Understand the basic fundamental of C la	anguage.
	 2.1 Operators 2.1.1 Arithmetic Operators 2.1.2 Assignment Operator 2.1.2 Unary operators 2.1.3 Relational & Logical Operators, 2.1.4 Conditional & Comma Operator 2.2 Simple Statement 2.3 Input and Output Library Functions 2.3.1 printf() 2.3.2 scanf() 2.3.3 getchar() 2.3.4 putchar() 2.3.5 gets() 2.3.6 puts() 	
COURSE O	UTCOMESMEE408-3 Use if- else , do- while, switch, neste	d loop and write C
program.		07
 3 CONTROL STATEMENTS 3.1 Decision making and branching 3.1.1 if Statement(if, if-else, if-else ladder, nested if-else) 3.1.2 Switch, break, continue, goto statement 3.2 Decision making and looping 3.2.1 While, do – while, for Statements 3.2.2 Nested loops 		
COURSE O	UTCOMESMEE408-4 Understand the function, array and deve	lop logic
4	 FUNCTIONS 4.1 Defining a Function, Accessing a function, 4.2 Passing arguments to a Function(call by value), Specifying argument data types 4.3 Scope and lifetime of variables 	04

	Section II					
Sr. No.	Topics / Subtopics	Lectures (Hours)				
COURSE O	COURSE OUTCOMESMEE408-5Write program by using Structures and Point					
	ARRAYS & CHARACTERS & STRINGS					
5	5.2 One dimensional array ,Declaration and Initialization of Arrays,					

	 5.3 Two Dimensional Arrays Declaration and Initialization of Arrays 5.4 The char data type, using character variables, using string 5.5 Declaring and initializing string variables, 5.6 Reading strings from terminal 5.7 Writing Strings to screen, putting strings together. 5.8 Comparison of two strings 5.9 String- handling Functions 	05
COURSE O	JTCOMESMEE408-5 Write program by using Structures and Po	inters.
6	 STRUCTURES AND POINTERS 6.1 Simple structures (Defining & declaring structures, accessing structure members) 6.2 Understanding pointers, declaring pointer variable, initialization of pointer variable, accessing address of a variable 	04

TERM WORK

Term work shall consist of the following: i) Laboratory experiments and related skills to be developed :

Sr	Title of Practical	Shills / Commetencies to be developed	Course
No.	Exercise	Skills / Competencies to be developed	Outcome
	Study of Flowcharts	1.1 Understanding an Algorithm	
	and Algorithm	1.2 Understanding the Flowchart	
1		1.3 Study of various Flowchart Symbols	MEE408-1
		21. 1.4 To draw Flowchart on any	
		Practical routine	
02	Character set and	2.1 Detail study of character set of C language	
	Operators	2.2 Understanding Operator	MEE408-1
		2.3 Various types of operator and their use	
03	Simple programming	3.1 Standard Input function- scanf(),gets(),	
	using Input and	getchar()	
	Output Functions.	3.2 Standard Output function-printf(), puts(),	
		putchar	WILL400-2
		3.3 Syntax and use of scanf() and prinf()	
		function with example	
04	Use of Operators	4.1 Study of Different operators in C	
		4.2 Use of arithmetic expression.	
		4.3 Use of Logical Expression	WILL400-5
		4.4 Programs Based on Different Operators	
05	Study of Control	5.1 conditional and unconditional branching	MEE408-3

	statements	5.2 syntax and use of go to statement5.3 Program based on goto statement & Conditional operators	
06	Study of control structure	 6.1 necessity of control structure 6.2 types of control structure Decision making statements 	
		 Decision making statements If statement If-else statement 6.3 syntax and flowchart of if-else statement 6.4 Program based on if –else statement 	MEE408-3
07	Study of control structure: switch statement	7.1 use of switch statement7.2 Syntax and flowchart of switch statement.7.3 Program using switch statement	MEE408-4
08	Study of for statement Study of while loop	 8.1 definition of loop 8.2 syntax and flowchart of for loop 8.3 Program based on for loop 8.4 Exit control and Entry control loop 8.5 syntax and flowchart of while loop &Do- while loop 8.6 program based on while loop & Do 	MEE408-4
09	Study of function	 9.1 Understanding function 9.2 function declaration or prototype 9.3 syntax to declare a function 9.4 function call 9.5 Program using functions 	MEE408-5
10	Study of an array	 10.1 Understanding and use of an array 10.2 syntax to declare an array 10.3 read and print the elements of an array 10.4 Any Two programs based on arrays 	MEE408-5
11	Study of standard string function	11.1syntaxanduseof:strcat(),strlen(),strcmp(),strcpy()11.2Program based on string functions	MEE408-5
12	Study of Simple Structure	12.1 Understanding and syntax of structure12.2 Declaration and use of variables of structure12.3 Program for declaring and defining a structure	MEE408-5

C) INDUSTRIAL EXPOSURE :

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

- f. Follow safe practices
- g. Practice good housekeepingh. Practice energy conservation
- i. Maintain tools and equipment

Follow ethical practices

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION m) Assessment Criteria for Term work :

i) Progressive Skills Test :

Criteria for Continuous Assessment of Practical work and Progressive skill Test : Assessment of term work as per Pro-forma III.

Domain	Particulars	Marks out of 50
Cognitive	Understanding	05
Cognitive	Application	05
Developmentor	Operating Skills	10
Psychomotor	Drawing / drafting skills	10
Affective	Discipline and punctuality	10
Allective	Decency and presentation	10
	50	

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES :

InstructionalMethods :

1) Lectures and discussions.

- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources:

- 1. Books
- 2. Transparencies
- 3. Power Point Presentation
- 4. Self-learning

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title
1.	E.Balgurusamy	Programming in ANSI C
2.	YashwantKanetkar	Let us C
3	kerninghan& Ritchie	The .C. Programming language

b) Websites

- 1. <u>http://cplus.about.com/od/beginnerctutoriali/a/blctut.htm</u>.
- 2. http://computer.howstuffworks.com/c.htm
- 3. <u>http://www.indiastudycenter.com/studyguides/sc/objtest/default.</u>

COURSE ID:

Course Name	: COMPUTER APPLICATIONS
Course Code	: MEE409
Course Abbreviation	: ECPA

Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	
Practical	02	04

Evaluation Scheme :

Modo of	Progressive Assessment		Term End Examination			
Evaluation	Theory	Dractical	Theory	Torm Work	Oral	Total
	Theory Practical		Examination		Examination	
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	_	
Marks	-	-	-	25	25	50

Rationale:

The need of today's manufacturing industrial world is based on best quality & precision oriented shorter manufacturing cycle time .To satisfy this need the use of CAD/CAM & automation is inevitable .To satisfy industrial need, diploma engineer should be able to cope with CAD/CAM technology. With this intention this subject is introduced in the curriculum. The prerequisites of this subject have been introduced in earlier subjects such as engineering graphics, engineering drawing & mechanical engineering drawing.

CAD/CAM technology is moving in the direction of greater integration of design activities & manufacturing activities. CAD covers the use of computer to assist creation, modification and analysis of design CAM include the use of computer to plan manage & control the operation in manufacturing

COMPETENCY:

Drafting of mechanical engineering drawing by using Auto Cad software. **Cognitive :** Understand the drawing views, dimensions and selecting drawing commands of Autocad software. **Psychomotor :** Draw detailed drawing of component **Affective :** Attitude of i) needness ii) imagination skill COURSE OUTCOMES : MEE409-1Understand the basic fundamental of Autocad. MEE409-2Use drawing and modifier tool bar. MEE409-3Draw 2D drawings with different styles of dimensions. MEE409-4 Draw 3D models of mechanical components. MEE409-5Plot 2D and 3D drawings.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experi ments and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO 1 Work in mfg & service sector	PSO 2 Start entrepre neurial ativity
Competen cy:	3	3	3	3	3	-	2	3	1	3	2	3
MEE409-1	3	3	3	1	2	-	2	2	1	3	3	2
MEE409-2	3	3	3	1	2	-	1	2	2	3	3	3
MEE409-3	2	2	3	1	2	-	1	2	1	2	3	2
MEE409-4	3	3	3	1	3	-	2	2	1	3	3	3
MEE409-5	3	3	3	2	3	2	2	3	2	3	2	2

CONTENT :

A) THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lecture s(Hours)	Theory Evaluation Marks	
COURSE	OUTCOMESMEE409-1Understand the basic fundamental	of Autocad		
1	 INTRODUCTION TO AUTO CAD 1.1 GUI and work places 1.2 File Management: New, Open, Save 1.3Drawing simple sketches 1.4Draw tool bar: Line, Circle, Arc, rectangle, Polygon, polyline, Ellipse, Spline Display Control: Zoom, Pan. 1.5Setting up limits, units, drafting settings. 1.6Types of Co-ordinate systems: Absolute, Relative , Polar 	06		
COURSE OUTCOMESMEE409-2 Use drawing and modifier tool bar				
2	MODIFY AND PROPERTY MANAGEMENT: 1.1 Modify tool bar: Move, Copy, Rotate, Array, Scale,	04		

Sr. No.	Topics / Sub-topics	Lecture s(Hours)	Theory Evaluation Marks	
COURSE	OUTCOMESMEE409-1Understand the basic fundamental	of Autocad		
COURSE	 Mirror, Offset, Trim, Join, Break, Extend, Hatch, Fillet, Chamfer. 1.2 Managing Properties: Line Type, Colour, Line weight, Use of quick properties 2.3 Layer Management 2.4 Match properties 	nt styles of	dimonsions	
	ANNOTATIONS.	It styles of		
	 3.1 Text: Mtext, Single line text, Style manager, Text editor. 3.2 Dimensioning: Line, Circle, Angle, Arc, Jogged, Ordinate, Arc Length. 3.2 Base line and Continuous dimensioning, Quick dimensioning. 3.3 Enquiry Commands: Utilities tool bar(Checking Distance, Angle and Area) 3.5 Dimension style manager 3.6 Multileader style manager 	04		
COURSE OUTCOMESMEE409-4 Draw 3D models of mechanical components				
4	BLOCK: 4.1 Block editor, design, center, tool pallet.	02		
	TOTAL	16	NA	
Semester e one and ha above allot	Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

SECTION-II

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation Marks	
COURSE	OUTCOMESMEE409-4 Draw 3D models of mechanic	al compon	ents	
05	INTRODUCTION TO 3D MODELLING:			
	 5.1 Work places: 3D Modelling 5.2 Solid primitives: Box, Wedges, Cylinder, Cone, Sphere, Torus, Pyramid, Polysolid. 5.3 Creating regions, Boundary 5.5 Difference between region and boundary, 5.5 Extrude and Revolve 5.6 isometric and Perspective views 5.7 Boolions: Union, Subtract, Intersect, Interfere. 5.8 3 D Move, 3D Array, 3 D Rotate, 3D Mirror 5.9 Navigation Tools: orbit, Free orbit, Continuous orbit. 5.10 Sweep 5.11 Loft: c/s only, guides, path. 	08		
COURSE	OUTCOMESMEE409-4 Draw 3D models of mechanic	al compon	ents	
06	 SOLID EDITING AND RENDERING: 1.1 Solid Editing: Face operations, Edge operations, Shell,Separate slice. 6.2 Rendering: Applying materials, Managing view ports. 	04		
COURSE	OUTCOMESMEE409-5 Plot 2D and 3D drawings			
07	VIEWS MANAGEMENT:	04		
	7.1 Layout Management: Layouts, Using Templates, V ports7.2 plotting and plot control			
	TOTAL	16	N A	
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.				

Specification table for setting question paper for semester end theory examination: N.A.

B) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work in practical sessions of batches of about 22 students :

Sr. No	Laboratory experience	Skills / Competencies to be developed	Course Outcome
•			
1	Using 2D auto CAD, draw orthographic	Drafting of 2D drawing.	MEE409-1
	Projection of any two simple components.		
2	Using 2D auto CAD, draw orthographic	Drafting of 2D drawing.	MEE409-2
	Projection of machine components:		
	Coupling and Pulley.		
3	Using 2D Auto CAD draw anyone of the	Drafting assembly drawings and its	MEE409-3
	listed assembly drawing having at least	details.	
	five components: foot step bearing,		
	Plummer block, Four way tool post, Pipe		
	vice		
4	Using 3D auto CAD draw Isometric views	Drafting an isometric view of simple	MEE409-4
	of any two components.	components.	
5	Using 3D auto CAD draw Isometric views	Drafting an isometric view of simple	MEE409-5
	of any one among the listed components:	components.	
	Pipe joint, Pin Joint.		

C) INDUSTRIAL EXPOSURE :

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

- j. Follow safe practices
- k. Practice good housekeeping
- 1. Practice energy conservation
- m. Maintain tools and equipment

Follow ethical practices

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

n) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Davahamatan	Operating Skills	10
Psychomotor	Drawing / drafting skills	10

Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		50

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES:

- 1) Lectures and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources, including references:

- 1) Chalk-board.
- 2) Demonstrative kits.
- 3) Demonstrative charts.

REFERENCE MATERIAL :

a) Books:

Sr. No.	Author	Title	Publication
01	P.N. Rao	CAD/CAM Principles and	Tata McGraw-Hill
		Applications	
02	RadhaKrishna P. &	CAD/CAM/CIM	Wiley Eastern Ltd.
	Subramanyam		
03	AutoCAD R-14	David Frey	BPB Publications

b) Websites :

www.cadtutor.net/tutorials/autocad/ www.cad-notes.com/contents/autocad-articles www.auto-cad-tutorial.com
COURSE ID:

Course Name	:MECHANICAL MEASUREMENTS AND
	MECHATRONICS
Course Code	: MEF410
Course Abbreviation	:FMMM

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) :<*nil* > **Teaching Scheme :**

Scheme componentHours / weekCredit
sTheory0305Practical02

Evaluation Scheme :

Mada of	Progressive Assessment		Term			
Figure 01	Theory	Dractical	Theory	Torm Work	Oral	Total
Evaluation	Theory	Flactical	Examination		Examination	
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	_	
Marks	20		80	25	-	125

RATIONALE :

Measurement plays an important role in all branches of engineering. Students needs to familiar with the advanced measurement techniques along with the principles of instruments. The integration of electronics engineering, electrical engineering, computer technology and control engineering with mechanical engineering is increasing in industrial sector, forming a vital part in the design, manufacture and maintenance of wide range of engineering products, processes and measurement systems. As a consequence, there is a need for a diploma engineers to understand such systems used in measurement and automation.

COMPETENCY: Measure mechanical measurement variables.Cognitive: -Identify transducers & sensor to measure variables.Psychomotor :Select and measure mechanical measurement variables.Affective : Attitude of i) Analytical Thinking ii) Accuracy ii) Precision.

COURSE OUTCOMES :

MEF410.1- Distinguish various static & dynamic terms of the instruments.MEF410.2-Describe working & application of various transducers.MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow.

MEF410.4-Select & measure variables using appropriate sensor & transducers. MEF410.5- Identify various input and output devices in an automated system. MEF410.6- Describe working & applications of various actuators .

[Prog	ramme O	utcomes	POs and	PSOs			
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experi ments and practice	PO 4 Enginee ring Tools	PO 5 The enginee r and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individ ual and team work	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Work in mfg.& service sector	PSO2 Start entrepr eneurial activity
Competen cy	-	3	3	-	-	-	-	-	-	-	2	-
MEF410.1	-	3	1	-	-	-	-	-	-	-	3	-
MEF410.2	-	3	1	-	-	-	-	-	-	-	3	-
MEF410.3	-	3	3	-	-	-	-	-	-	-	3	-
MEF410.4	-	3	3	-	-	-	-	-	-	-	3	-
MEF410.5	-	2	2	-	-	-	-	-	-	-	2	-
MEF410.6	-	3	2	-	-	-	-	-	-	-	2	-

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

CONTENT :

A. THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	MEF410.1- Distinguish various static & dynamic terms of	the instrument	ts.
1	 MEASUREMENT SYSTEM &CHARACTERISTICS OF MEASURING INSTRUMENTS: 1.1 Measurement -Methods of measurement, Classification of Instruments 1.2 Generalized measurement system and its functional elements 1.3 Static terms and characteristics: Range ,Span, Accuracy , Precision, Reliability, Errors and Correction, Calibration, Hysteresis and Dead zone, Drift, Sensitivity, Threshold and Resolution, Repeatability and Reproducibility, Linearity 1.4 Dynamic Terms and Characteristic : Speed of response, Measuring Lag, Dynamic Error and Fidelity, Overshoot, Dead Time and Dead Zone 1.5 Zero, First and Second order instruments 1.6 Classification of errors, Causes of errors & Remedies. 	08	12

MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 2 MEASUREMENT SENSORS 2.1 Position measurement: Proximity Sensors and Switches, Potentiometer, Digital Optical Encoders, Linear Variable Differential Transformer(L.V.D.T.) 2. Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometer: Drag cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, capacitive pick up, Photoelectric pick up, Stroboscope 10 16 2.3 Strain measurement: Types of strain gauge, Applications , Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Resistance Strain gauge, Measuring different states of stress with strain gauge, Aeasuring different states of stress with strain gauge Load Cell 2.4 Temperature Measurement: Thermocouple, Electrical Resistance Thermometer Optical and Radiation pyrometer, Thermistor MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 3 3 MISCELLANEOUS MEASUREMENT 3.1 Force & Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer, 3.2 Flow measurement-direct and indirect Method, 3.4 Humidity Measurement-direct and indirect Method, 3.4 Humidity Measurement :Absorption Hygrometer 3.5 Acoustics Measurement :Sound level meter, Flezoelectric crystals type, Microphones-Carbon and Electrodynamics Microphone. UTAL 24 40	Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)			
MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 2 MEASUREMENT SENSORS 10 16 3 Netasurement: Proximity Sensors and Switches, Potentiometer, Digital Optical Encoders, Linear Variable Differential Transformer(L.V.D.T.) 12.2 Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometers. Electrical Tachometer: Darg cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, Photoelectric pick up, Stroboscope 2.3 Strain measurement: Types of strain gauge, applications, Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Selection and materials of strain gauge, Resistance Strain gauge, Measuring different states of stress with strain gauge, Load Cell 2.4 Temperature Measurement: Classification, Liquid in Glass, Pressure , Bimetallic thermometer Optical and Radiation pyrometer, Thermistor MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 3 MISCELLANEOUS MEASUREMENT 06 12 3.1 Force & Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer, Ultrasonic flow meter, 3.2 Flow measurement-Hydraulic Measurement -Borgorient etchniques to measure position etpe 06 12 3.3 Liquid level Measurement -Absorption Hygrometer 3.3 Liquid blevel Measurement -Absorption Hygrometer 24 40 Semester end exam question page should be such that total marks of questions on each toric is one and		MEE410.2-Describe working & application of various	transducers.				
flow. 2 MEASUREMENT SENSORS 10 16 2.1 Position measurement: Proximity Sensors and Switches, Potentiometer, Digital Optical Encoders, Linear Variable Differential Transformer(L.V.D.T.) 12.2 Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometer: Drag cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, capacitive pick up, Photoelectric pick up, Stroboscope 10 16 2.3 Strain measurement: Types of strain gauge, applications , Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Resistance Strain gauge, Measuring different states of stress with strain gauge, Load Cell 2.4 Temperature Measurement: Classification, Liquid in Glass, Pressure ,Bimetallic thermometer Thermocouple, Electrical Resistance Thermistor 06 12 MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 3 11 06 12 3 MISCELLANEOUS MEASUREMENT Optical and Radiation pyrometer, Thermistor 06 12 3 MISCELLANEOUS MEASUREMENT 3.1 Force & Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer. 06 12 3.1 With Measurement -Absorption Hygrometer 3.2 Low measurement-Special methods-Turbine type flow Meter, Hot wire Anemometer, Ultrasonic flow meter. 24 40 Semester end exam question paper should be such that total ma	MEF410.3- Use different techniques to measure position, speed, strain, temperature, force &						
2 MEASUREMENT SENSORS 10 16 2.1 Position measurement: Proximity Sensors and Switches, Potentiometer, Digital Optical Encoders, Linear Variable Differential Transformer(L.V.D.T.) 2.2 Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometer: Drag cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, capacitive pick up, Photoelectric pick up, Stroboscope 10 16 2.3 Strain measurement: Types of strain gauge, applications , Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Selection and installation of strain gauge, Resistance Strain gauge, Heasuring different states of stress with strain gauge, Load Cell 2.4 Temperature Measurement: Classification, Liquid in Glass, Pressure Bimetallic thermometer Thermocouple, Electrical Resistance Thermometer Optical and Radiation pyrometer, Thermistor 06 12 MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 3 MISCELLANEOUS MEASUREMENT 3.1 Force & Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer, Ultrasonic flow Meter, Hot wire Anemometer, Ultrasonic flow meter. 3.3.Liquid level Measurement - Absorption Hygrometer 3.5 Acoustics Measurement : Absorption Hygrometer 3.5 Acoustics Measurement : Absorption Hygrometer 3.5 Acoustics Measurement : Sound level meter, Piezoelectric crystals type, Microphones-Carbon and Electrodynamics Microphone. 24 40	flow.	flow.					
2 MEASUREMENT SENSORS 10 16 2.1 Position measurement: Proximity Sensors and Switches, Potentiometer, Digital Optical Encoders, Linear Variable Differential Transformer(L.V.D.T.) 2.2 Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometer: Drag cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, capacitive pick up, Photoelectric pick up, Stroboscope 10 16 2.3 Strain measurement: Types of strain gauge, applications , Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Selection and installation of strain gauge, Resistance Strain gauge, Measuring different states of stress with strain gauge, Load Cell 2.4 Temperature Measurement: Classification, Liquid in Glass, Pressure, Bimetallic thermometer Thermocouple, Electrical Resistance Thermometer Optical and Radiation pyrometer, Thermistor 06 12 3 MISCELLANEOUS MEASUREMENT 0.1 Force & Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer. 3.2 Flow measurement-special methods-Turbine type flow Meter, Hot wire Anemometer, Ultrasonic flow meter. 3.3 Liquid level Measurement-direct and indirect Method. 3.4 Humidity Measurement : Absorption Hygrometer 3.5 Acoustics Measurement : Absorption Hygrometer 3.5 Acoustics Measurement : Absorption Hygrometer 3.5 Acoustics Measurement : Microphones. and Electrodynamics Microphone. 24 40							
2.1 Position measurement: Proximity Sensors and Switches, Potentinometer, Digital Optical Encoders , Linear Variable Differential Transformer(L.V.D.T.) 2.2 Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometer: Drag cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, capacitive pick up, Photoelectric pick up, Stroboscope 2.3 Strain measurement: Types of strain gauge, applications , Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Resistance Strain gauge, Measuring different states of stress with strain gauge, Load Cell 2.4 Temperature Measurement: Classification, Liquid in Glass, Pressure, Bimetallic thermometer Thermocouple, Electrical Resistance Thermometer Optical and Radiation prometer, Thermistor 06 12 3 MISCELLANEOUS MEASUREMENT 3.1 Force &Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer. 3.2 Flow measurement-special methods-Turbine type flow Meter, Hot wire Anemometer, Ultrasonic flow meter. 3.3 Liquid level Measurement -Absorption Hygrometer 3.5 Acoustics Measurement : Absorption Hygrometer 3.	2	MEASUREMENT SENSORS	10	16			
Switches, Potentionneter, Digital Optical Encoders , Linear Variable Differential Transformer(L.V.D.T.) 2.2 Speed Measurement: Mechanical Tachometers: High speed indicator, Centrifugal force Tachometers. Electrical Tachometer: Drag cup, Cumulated capacitor, Tachogenerator. Contactless Electrical Tachometer: Inductive pick up, capacitive pick up, Photoelectric pick up, Stroboscope 2.3 Strain measurement: Types of strain gauge, applications , Gauge Factor, Requirements and materials of strain gauge, Selection and installation of strain gauge, Selectical Resistance Thermometer Thermocouple, Electrical Resistance Thermometer Thermocouple, Electrical Resistance Thermometer MEF410.3-Use different techniques to measure position, speed, strain, temperature, force & flow. 3 MISCELLANEOUS MEASUREMENT 3.1 Force &Torque Measurement-Hydraulic Dynamometer, Eddy current Dynamometer, Strain gauge transmission Dynamometer, Strain gauge transmission Dynamometer, Ultrasonic flow Meter, Hot wire Anemometer, Core 3.3.Liquid level Measurement-direct and indirect Method. 3.4 Humidity Measurement -direct and indirect Method. 3.4 Humidity Measurement -direct and indirect Method. 3.4 Humidity Measurement: Sound level meter, Piezoelectric crystals type, Microphones-Carbon and Electrodynamics Microphone. TOTAL 24 40		2.1 Position measurement: Proximity Sensors and					
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Piezoelectric crystals type, Microphones-Carbon Image: Carbon and Electrodynamics Microphone. Image: Total 24 40 Semester end exam question paper should be such that total marks of questions on each topic is one and half times the		3.5 Acoustics Measurement: Sound level meter,					
and Electrodynamics Microphone.TOTAL242440		Piezoelectric crystals type, Microphones-Carbon					
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Semester end exam question paper should be such that total marks of questions on each topic is one and half times the		TOTAL	24	40			
	Semester end	exam question paper should be such that total marks of questions on	each topic is one	and half times the			

SECTION-II

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)
MEF410.4	-Select & measure variables using appropriate sensor & tra	ansducers.	
4	MECHATRONICS SYSTEM	10	16
	4.1 Mechatronics- Introduction		
	4.2 Introduction of Microprocessor and Microcontroller,		
	Microprocessor systems -Buses, Memory, Input/		
	Output		
	4.3 8051 Microcontroller		
	Architecture, Pin configuration, working of		
	Microcontroller and applications.		
	4.4 Comparison of Microprocessor and Microcontroller 4.5 Programmable Logic Controller(PLC) Introduction		
	PI C definition Basic structure PI C block		
	diagram Input/Output Selection of PLC		
MEF410.5	- Identify various input and output devices in an automate	d system.	
5	DATA ACOUISITION	- 04	08
5	5.1 Generalized data Acquisition system	04	Vð
	5.2 Data loggers		
	5.3 Analog to Digital conversion:		
	A/D Converters-Successive Approximation A/D		
	Converter, A/D Flash Converter, Digital to Analog		
	conversion		
MEF410.6	- Describe working & applications of various actuators.		
6	ACTUATORS	10	16
Ū	6.1 Electromagnetic principles.	10	10
	Solenoids and Relays:		
	Electromagnetic Relay, Reed Relay,		
	Mercury wetted reed relay.		
	6.2 Electric motors: Construction and working		
	Field- current, Field-Field Interaction, D.C.Motors		
	6.3 Stepper motors.		
	6.4 Variable Frequency Drives		
	6.5 Selection of motors.		
	6.6 Hydraulic and Pneumatic Actuation systems		
	Hydraulic and Pneumatic system-components and		
	General Working,		
	Hydraulic valves-Directional control valves,		
	Pressure control valve		
	Hydraulic and Pneumatic Actuators (Cylinder).		
	Kotary Actuators.		4.2
~	1 otal	24	40
Semester end marks allotted	exam question paper should be such that total marks of questions on d above but the candidates are able to attempt questions of the above a	each topic is o allotted marks o	ne and half times the only.

Toni		D	Distribution of marks			Total	
c No.	Name of topic	Knowledge	Comprehension	Applicati on	Outcome	marks	
1	MEASUREMENT SYSTEM &CHARACTERISTICS OF MEASURING INSTRUMENTS:	04	04	04	MEE410.1	12	
2	MEASUREMENT SENSORS	04	04	08	MEE410.2 MEE410.3	16	
3	MISCELLANEOUS MEASUREMENT	04	04	04	MEE410.3	12	
4	MECHATRONICS SYSTEM	08	04	04	MEE410.4	16	
5	DATA ACQUISITION	02	04	02	MEE410.5	08	
6	ACTUATORS	08	04	04	MEE410.6	16	
	Total >>	30	24	26		80	

Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B. TERM WORK

Practical Exercises and related skills to be developed : The following practical exercises shall be conducted as Term Work .

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Determination of flow rate	Measurement of fluid flow.	MEE410.3
2.	Speed measurement by Magnetic and Photoelectric Pick up	Measurement of speed of Shaft.	MEE410.3
3.	Pressure measurement by using Piezo- resistive Sensor.	Measurement of Pressure.	MEE410.3
4.	Temperature measurement by using Thermocouple.	Measurement of Temperature.	MEE410.3
5.	Displacement measurement by Linear variable differential transformer.	Measurement of displacement.	MEE410.3
6.	Strain measurement by Resistive wire strain gauge.	Measurement of strain	MEE410.3
7.	Identification and demonstration of different actuators.	Operation and selection of Various actuators	MEE410.6
8.	Demonstration of the working of various digital to analog and analog to digital converters	Operating A/D & D/A converters	MEE410.5

C. ASSESSMENT CRITERIA FOR TERM WORK

a) Continuous Assessment of Practical :

Every practical experiment shall be assessed for 25 marks as per following criteria

Sr. No.	Criteria	Marks allotted
1	Quality and neatness of term work	05
2	Attendance	05
3	Participation	05
4	Understanding	10
	Total	25

b) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted.

Final Assessment of Term work shall be done as per Pro-forma III.

D. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1	Expert Lecture from Industry	Mechatronics System and application

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom Practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD
- 3. Videos presentations
- 4. Assignments

REFERENCE MATERIAL :a) Books

Sr. No.	Author	Title	Publisher
1.	Bolton W	Mechatronics- Electronic control systems in Mechanical and Electrical Engineering	Pearson Education Ltd
2.	Histand B.H. and Alciatore D.G	Introduction to Mechatronics and Measurement systems	Tata McGraw Hill Publishing
3.	R.S. Sirohi and H.C. Radhakrihna	Mechanical Measurements	New Age international Publishers
4.	HMT	Mechatronics	Tata McGraw Hill Publishing
5.	Mahalik N.P.	Mechtronics principles, concepts	Tata McGraw Hill Publishing

		and applications	
6.	Singh, Joshi	Mechatronics	Prentice-Hall India
7	NIIT	Programmable Logic Control	Prentice-Hall India
8	A.K. Sawhney	Mechanical Measurements & Instrumentation	Dhanpat Rai & Sons, New Delhi

b) Websites

- i) http://elearning.vtu.ac.in/18/enotes/10ME42/Unit%205-6-GSP.pdf
- ii) http://www.npl.co.uk/upload/pdf/beg-guide-measurement-mech-eng.pdf
- iii) http://www.hljp.edu.cn/attachment/20120831082417983.pdf
- iv)http://elearning.vtu.ac.in/18/enotes/10ME42/Unit%205-6-GSP.pdf

v)http://nptel.ac.in/courses/112103174/pdf/mod1.pdf

LEVEL – V MANAGEMENT AND DIVERSIFIED COURSES

COURSE ID:

Course Name	: INDUSTRIAL ORGANIZATION AND MANAGEMENT
Course Code	: CCF501
Course Abbreviation	: FIOM

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <*nil* >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	02
Practical		05

Evaluation Scheme :

Modo of	Progressiv	ve Assessment	Term End H		
Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	 25 marks for each practical One PST of 25 marks 	Term End Online Theory Exam	As per Proforma-III	
Marks	20		80	-	100

RATIONALE :

Management ability is a higher-grade ability, which every successful engineer must possess. This science has been developed in those days when it was treated as an art in earlier stages. It is impossible for an individual though technically sound to achieve goals of the organizations. Effective implementation of management policies is a tough task. The Diploma holder should learn these principles of management and various techniques.

COMPETENCY: Plan and implement managerial and administrative strategies.

Cognitive : Use management principles and techniques.

Psychomotor : i) Apply management principles ii) Control inventory iii) Use personal protective devices for safety **Affective :** Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

Affective: Annuale of 1) precision (1) accuracy (1) safety (v) punctuality v) aesthetic press

COURSE OUTCOMES :

CCF 502.1 Apply principles of management and carry out various functions of management.

CCF502.2 Prepare organization structure for small and medium scale industry.

CCF 502.3 Perform duties of stores Incharge, material and finance manager.

CCF502.4 Practice industrial safety rules, codes, practices and acts.

CCF502.5 Apply various modern management techniques.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Work in Mfg. & Servi ce sector	PSO 2 Start entrep reneu rial activit y
Competency:	2	-	-	-	-	-	-	3	-	-	1	2
CCF501.1	2	-	-	-	-	-	-	3	-	-	1	2
CCF501.2	2	-	-	-	-	-	-	3	-	-	1	2
CCF501.3	2	-	-	-	-	-	-	3	-	-	1	2
CCF501.4	2	-	-	-	-	-	-	3	-	-	1	2
CCF501.5	2	-	-	-	-	-	-	3	-	-	1	2

CONTENT :

C) THEORY:

SECTION -I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCF	502.1 <i>Apply principles of management and carry out various functions c</i>	of manageme	ent.
2	 PRINCIPLES OF MANAGEMNET 1.1 Concept of management 2 Principles of management 3 Objectives of management 4 Scope and importance of management 5 Levels of management 1.6 Managerial competencies : Communication, Planning and Administration, Team work, Strategic action and General awareness FUNCTIONS OF MANAGEMENT 2.1 Planning: Forms of planning, Strategic levels and Planning, Phases of Planning 2.2 Decision Making: Decision making conditions, Basic types of Decisions 3 Organizing: Introduction to Organization design, basic types of Departmentalization, Co-ordination, Authority 2.4 Motivation: Work Motivation, Three approaches to Motivation, 2.5 Leadership: Leadership and Power, Leadership Development 2.6 Communication: The Communication process, Impact of Information Technology, Hurdles to effective communication 2.7 Controlling: Foundations of control, creative Effective control, Primary methods of control 	06 08	10
	Finnary methods of control		

3	HUMAN RESOURSE MANAGEMENT(Personnel Management)3.1 Definition and concept,3.2 Aim, Objectives and functions of HR dept.3.2 Principles of personnel policy, details recorded in policy3.3 Recruitment and selection of employees3.4 Training : Objectives, benefits, types and methods	06	10
	3.5 Workers Participation in Management		
	CCF 502.2 Prepare organization structure for small and medium so	ale industry.	
4	FORMS OF BUSINESS ORGANISATION 4.1Types of industrial sectors 4.2 Forms of business organization 4.3 Individual Proprietorship 4.4 Partnership 4.5 Joint stock companies 4.6 Co-operatives 4.7 Public sectors 4.8 Government undertakings.	04	08
	Total	24	40
Sem time only	ester end exam question paper should be such that total marks of questions on as the marks allotted above but the candidates are able to attempt questions of t c.	each topic is o he above allott	ne and half ed marks

SECTION II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF 502.3Perform duties of stores Incharge, material and find	ance manag	ger.
5	MATERIALS MANAGEMENT	06	10
	5.1 Importance of purchase		
	5.2 Functions and Objectives		
	5.3 Duties of purchasing officer		
	5.4 Methods of purchasing and procedure		
	5.5 Scope and importance of material management		
	5.6 Objectives of material management		
	5.7 Duties of Material manager		
	5.8 Concept of supply chain management		
	5.9 Modern trends in material management : MRP,ERP		
6	FINANCIAL MANAGEMENT	04	08
	6.1 Concept, Scope and Importance		
	6.2 Functions of financial management		
	6.3 Types of capital: Fixed, working		
	6.4 Factors affecting Working capital		
	6.5Capitalization : over, under		
	6.6 Sources of Finance		
	6.7 Industrial taxation		

	CCF 502.4Practice industrial safety rules, codes, practices	s and acts.	
7	 INDUSTRIAL ACT & SAFETY 7.1 Factory Act, Boiler Act, Workmen Compensation Act, ESI Act, pollution Control Act 7.2 Accidents: Economic aspects, direct and indirect cost of accidents Causes, Types, Remedies, Personal Protective Equipments (PPE), Reporting & Investigation of accidents 7.3 Safety management: safety in industry, committees, programs, Safety codes, Safety training, 7.4 Occupational Safety and Health Administration – Promoting, norms and standards 7.5 Housekeeping: definition, concept, necessity, advantages, procedure 	08	12
	CCF 502.5Apply various modern management technic	ques.	
8	MODERN MANAGEMENT TECHNIQUES 8.1 PERT & CPM 8.2 Various terms related with network analysis 8.3 Various Time estimates 8.4 Construction of Network Diagram 8.5 Computation of Critical Path	06	10
	Total	24	40
Seme half ti marks	ster end exam question paper should be such that total marks of questions mes the marks allotted above but the candidates are able to attempt quest only.	on each top ions of the a	ic is one and bove allotted

Specification table for setting question paper for semester end theory examination :

Toni		Distribution o	Course	Total		
c No. Name of topic		Knowledge	Comprehension	Applic ation	Outcome	Marks
1	Principles Of Managemen	02	04	04	CCF501.1	10
2	Functions Of Management	02	04	06	CCF501.2	12
3	Human Recourse management	04	04	02	CCF501.2	10
4	Forms Of Business organization	02	04	02	CCF501.2	08
5	Materials Management	04	02	04	CCF501.3	10
6	Financial Management	02	02	04	CCF501.3	08
7	Industrial Act & Safety	04	04	04	CCF501.4	12
8	Modern Management Techniques	02	02	06	CCF501.5	10
TOTAL		22	26	32		80

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations

4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1	Banga and Sharma	Industrial Organisation & Management	Khanna Publisher
2	O P Khanna	Industrial Engg. & Management	Dhanpat Rai & sons New Delhi
3	P.C. Pandey & C.K.Sing	Management Science	Dhanpat Rai & sons New Delhi
4	Industrial Oraganisation	P.T. Ghan	Tata Mc Graw Hill
5	Management Information System	Waman S. Jawadekar	Tata Mc Graw Hill
6	P.C. Pandey & C.K.Sing	Management Science	Dhanpat Rai & sons New Delhi

b) Websites

- i) nptel/iitm.ac.in
- ii) http://iete.ac.in/subjects/amindustry/Mgmt.htm

* * *

COURSE ID:

Course Name	: ENTREPRENEURSHIP DEVELOPMENT
Course Code	: MEF501
Course Abbreviation	: FEDP

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	01	02
Practical	02	05

Evaluation Scheme :

Mode of	Progressiv	ve Assessment	Term				
Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination	Total	
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	-		
Marks				50	-	50	

RATIONALE:

In the global market and economy of the date, innumerable opportunities have opened for the technicians. On the other side, the same situation has brought in many challenges. The student requires to be equipped with the competencies to take benefit of the opportunities and also the strength to meet the challenges. This course is designed to make the student aware about his own professional career and provide exposure to the world of entrepreneurship. Whether or not he starts his own enterprise, it is necessary for every student to have a bird's eye view of the whole industrial scenario and the related issues as that is going to be his future professional world. The three earlier courses in the series of *Personality Related Courses* will work as foundation for this terminal course of the series.

COMPETENCY:

Start career as an entrepreneur.

Cognitive: Understand various attributes of entrepreneurship.

Psychomotor: Prepare Project and feasibility report.

Affective: i) Develop attitude of Team work ii)Leadership skill iii)Accepting challenges in the

world of entrepreneurship. iii) Motivation iv) Generating creative business ideas.

v) Problem solving ability

COURSE OUTCOMES:

MEE501-1 Identify various career options and prepare career plan.

MEE501-2 Awareness of world market trends and national industrial Policies.

MEE501-3 Apply the concepts, elements of entrepreneurship and prepare a sample project

report.

MEE501-4 Analyze financial and marketing aspects of project.

MEE501-5 Apply management skill in entrepreneurship.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX: [Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": No correlation]

		Programme Outcomes Pos and PSOs												
Competenc y and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowle dge	PO 3 Experiment s and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environm ent and sustainabi lity	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Commu nication	PO 10 Life-long learning	PSO 1 Workin Mfg. & Service sector	PSO 4 Start entrepr eneurial activity		
Competenc y:	3	3	3	2	3	1	3	3	3	2	3	3		
MEF501-1	3	3	3	3	2	1	2	3	2	3	3	3		
MEF501-2	3	3	3	2	-	-	-	-	-	3	3	3		
MEF501-3	3	3	3	1	-	-	-	2	-	2	3	3		
MEF501-4	3	1	1	2	2	2	2	-	-	3	3	3		
MEF501-5	3	1	1	2	-	-	-	3	-	3	2	3		

A. Theory:

Sr. No.	TOPICS	Lectures (hours)			
Course	Outcome MEF501-1 Identify various career options and prepare career pla	n.			
1.	CAREER PLANNING				
	1.1 Professional Career: Concept and definition. Occupation, profession	02			
	and business.				
	1.2 Importance of career planning, goal setting.				
	1.3 Various career options for a diploma technician				
	1.4 Factors affecting choice of career: Personal factors – personality and				
	competencies, family background, individual strengths and constrains,				
	etc. External factors – Market situation and future trends, etc.				
	1.5 Preparing a career plan: Concreteness and flexibility of a career plan				
Course Outcome MEF501-2 Awareness of world market trends and national industrial					

2.	GLOBALIZATION, WORLD MARKET AND NATIONAL	
	INDUSTRIAL POLICIES	03
	2.1 Globalization and world market: Concept and phenomenon.	
	2.2 Influences of globalization on developing countries	
	2.3 Policies of Union and State Government on industrialization	
	and marketing	
	2.4 Various statutory bodies like DIC, MCED, MITCON, etc.	
	formed by the Government	
	2.5 Various Government schemes like Prime Minister Rojgar Yojana, etc.	
Course	e Outcome MEF501 -3 Apply the concepts , elements of entrepreneurship and p	repare a
sample	project report.	
3.	ENTREPRENEURSHIP	
	3.1 Concept, classification and characteristics of an entrepreneur	03
	3.2 Advantages and risks for an entrepreneur	
	3.3 Resources required for an enterprise	
	3.4 Growing an enterprise	
	3.5 Professionalism	
	3.6 Biographies of at least four great entrepreneurs	
Course	e Outcome MEF501-3 Apply the concepts, elements of entrepreneurship and pr	repare a
sample	project report.	
4.	ENTERPRISE PLANNING AND PROJECT REPORT	
	4.1 Steps in starting an enterprise : Individual SWOT analysis	02
	and personality factors assessment, emerging market trends	
	and market opportunities survey, feasibility analysis	
	4.2 Project Report : Contents of project report. Proforma of project report.	
Course	e Outcome MEF501-4 Analyse financial and marketing aspects of project.	
5.	FINANCIAL ANALYSIS AND ACCOUNTING	
	5.1 Cost of project : Sources of finance. Assessment of working	02
	capital. Product costing. Profit and break even analysis.	
	Financial ratios and their significance.	
	5.2 Financing Institutions	
	5.2 Business Accounting : Accounting principles and	
	methodology.	
Course	Poutcome MEF501-4 Analyse financial and marketing aspects of project.	_
6.	MARKET ASSESSMENT AND MARKETING	
	6.1 Definition of market and marketing	02
	6.2 Marketing channels and strategies	
	6.3 E-commerce	
Course	e Outcome MEF501 -5 Apply management skill in entrepreneurship.	
7.	ENTERPRISE MANAGEMENT AND DEVELOPMENT	
	7.1 Resources management	02
	7.2 Quality standards : ISO	
	7.3 Professional ethics, environmental protection, social aspects	

B. TERM WORK:

The assignments / exercises are designed so as to make the student apply the theoretical inputs to himself and get realistic guideline for his own career and entrepreneurship development skills.

Sr. No.	Title of the Lab work	Skills / Competencies to be developed	Course Outcome
1.	Goal setting and career planning for myself	Self-analysis and concept application	MEF501-1
2.	Exercise on working on a group task	Working in a group and leadership	MEF501-1
3.	Leadership exercise	Leadership skills	MEF501-1
4.	Group discussion on issues related to globalization	Discussing given problem in all	MEF501-2
5.	Group discussion on issues related to impact of globalization on India	dimensions	MEF501-2
6.	Survey of industrial environment of Kolhapur with reference to particular engineering discipline	Carrying out a survey. Getting awareness of industrial scenario.	MEF501-3
7.	Internet based information search and presentation of biography of two great entrepreneurs in particular engineering discipline	Analysis and inspiration	MEF501-3
8.	Me as a future entrepreneur : self SWOT analysis	Self-analysis and concept application	MEF501-3
9.	Brain storming exercise for generating creating ideas for products	Concreting creative business ideas and	MEF501-4
10.	Brain storming exercise for generating creating ideas for opportunities in service sector	evaluating them	MEF501-4
11.	Interviewing an entrepreneur	Interviewing Analyzing situations	MEF501-4
12.	Sample project report preparation	Undergoing complete sample exercise for starting a new enterprise	MEF501-3

C. ASSESSMENT CRITERIA FOR TERM WORK

a) Continuous Assessment of Practical :

Every practical experiment shall be assessed for 25 marks as per following criteria

Sr. No.	Criteria	Marks allotted
1	Quality and neatness of term work	05
2	Attendance	05
3	Participation/Presentation	05
4	Understanding	10
	Total	25

b) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted.

Final Assessment of Term work shall be done as per Pro-forma III.

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Discussions
- 2. Experts' guest Lectures

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD
- 3. Videos Audio presentations
- 4. Video films.
- 5. O.H.P, Slides

REFERENCE MATERIAL :

a) Books

Sr. No.	Author	Title	Publisher
1.	J.S.Saini and B.S.Rathore	Entrepreneurship - Theory and Pracice	Wheeler Publisher, New Delhi
2.	TTTI Chandigarh	Entrepreneurship Development	
3.	E. Gorden and K.Natrajan	Entrepreneurship Development	Himalaya Publishing, Mumbai
4.	J.B.Patel and D.G.Allampally	A manual on How to prepare a project report	
5.	J.B.Patel and D.G.Allampally.	A manual for business opportunity identification and selection	
6.	P.C.Jain	A handbook of new entrepreneurs	
7	S.B.Sareen and H. Anil Kumar	National Directory of entrepreneur Motivator and Resource Persons	
8	The seven business crisis and how to beat them	V.G.Patel	

a) Websites

o) <u>www.ediindia.org</u>

COURSE ID:

: QUALITY MANAGEMENT
: MEF502
: FQLM

TEACHING AND EVALUATION SCHEME : Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits	
Theory	02	04	
Practical	02	04	

Evaluation Scheme:

	Progressiv	ve Assessment	Term				
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External)	Total	
Details of Evaluation	Average of two tests of 20 marks each	v. 25 marks for each practicalvi. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-I		
Marks	20		80	25	-	125	

RATIONALE:

In spite of great development in machine tool technology it becomes necessary to confirm the variation in dimensions of the work pieces. This is because the change in dimension may occur due to variation in 3Ms- Man, Machine & Material. Variation in 3MS directly of the work piece. The variation in dimensions from the given tolerance of the machine part of work piece affects on the performance of that machine. Confirmation of the variation in dimensions can be achieved by collecting data & by using different statistical methods, which further helps control on variation in manufacturing process & of quality of product.

COMPETENCY:

Apply quality system tools and procedures for achieving desired product quality.

Cognitive: Understand quality system tools and procedures

Psychomotor: Prepare control charts for analyzing manufacturing process.

Affective: Attitude of using i) Procedures ii) Practices iii) Tools iv) Techniques for quality improvement

COURSE OUTCOMES:

MEF502.1- Recongnize the quality procedures and parameters for customer satisfaction. MEF502.2- Identify the practices of quality assurance and economics in an organization. **MEF502.3-** Prepare and apply statistical quality tools for regulating the manufacturing process. MEF502.4- Describe the concepts of total quality management (TQM) MEF502.5- Use tools and techniques for TQM. COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

	Programme Outcomes POs and PSOs											
Competenc y and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practic e	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commu nication	PO 10 Life- long learnin g	PSO1 Work in mfg& service sector	PSO 2 Start entrepr eneuria l activity
Competenc y:	2	3	3	3	1	-	-	2	2	3	3	1
MEF502-1	3	2	2	2	-	-	-	3	1	3	3	2
MEF502-2	2	2	3	3	-	-	-	2	1	3	1	-
MEF502-3	3	2	3	3	-	-	-	2	2	3	3	2
MEF502-4	2	3	1	1	-	-	-	1	1	2	2	3
MEF502-5	2	3	2	1	-	-	-	2	1	3	3	3

CONTENT:

A. THEORY:

Section-I

Sr.	Topics	Teachin g	Theory evaluation
190.		(Hours)	Marks
	MEF502.1- Recongnize the quality procedures and parameters for cu	stomer satisj	faction.
1	 INTRODUCTION TO QUALITY CONTROL 1.1 Definition & concept of Quality. 1.2 Inspection – concept, need, planning, difference between inspection & quality control 1.3 Quality of design, quality of conformance, & Quality policies. 1.4 Concept of reliability & maintainability. 1.5 Role of management & suppliers to ensure quality of the product. 	06	16
	MEF502.2- Identify the practices of quality assurance and economics	in an organ	ization
2	 QUALITY ASSURANCE 2.1 Concept of Quality Assurance. 2.2 Responsibilities of quality assurance. 2.3 Quality audit. 2.4 Quality circles, concept, purpose & function. 	06	14

	MEF502.2- Identify the practices of quality assurance and economic	s in an organ	ization
3	 QUALITY ECONOMICS 3.1 Cost of quality, value of quality & balance between the two. 3.2 Economics of quality design & quality of conformance 3.3Cost of quality : Appraisal, Prevention, External & Internal failure cost. 	04	10

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Section-II

Sr. No	Topics	Teaching (Hours)	Theory evaluation Marks
ME	EF502.3 - Prepare and apply statistical quality tools for regulating the mo	inufacturin	g process.
4.	 STATISTICAL QUALITY CONTROL 4.1 Meaning and importance of SQC 4.2 Meaning of frequency distribution, mean, mode, median standard deviation, 4.3 Normal distribution curve, Area under the curve & its interpretation. 4.4 Control charts for variables X & R charts 4.5 Process capability Analysis 	05	12
	<i>MEF502.4-</i> Describe the concepts of total quality managemen	t (TQM)	
5.	 TOTAL QUALITY MANAGEMENT(TQM) 5.1 TQM Definition & Basic Concepts 5.2 Deming philosophy of TQM 5.3 Characteristics of Quality Leaders. 5.4 Quality Council 5.5 Quality statements: Vision, Mission, Quality Policy 5.6 Characteristics of successful Teams 5.7 Continuous Process Improvement : Juran Triology, Kaizen, PDSA Cycle Poka Yoka 	05	14
	MEF502.5 - Use tools and techniques for TQM.		1
6.	TQM: TOOLS AND TECHNIQUES		

		06	14
	6.1 Seven tools of TQM: Pareto Diagram, Process Flow diagram,		
	Cause and Effect(ISHIKAWA)Diagram, Check sheet,		
	Histogram,		
	Control Chart, Scatter Diagram		
	6.2 Benchmarking: Definition, Purpose of Benchmarking		
	6.3 Six Sigma: Principle and application		
	6.4 Theory of 5 s.		
	6.5 ISO : Benefits of ISO, ISO 9000 Series of standards, ISO 14000		
	Series of Standards		
Seme	ster end exam question paper should be such that total marks of questions on each top	ic is one and	half times the

marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination:

Section		Distribut	ion of marks (lev	el wise)	Course	Tota
/ Topic No.	Name of topic	Knowledge	Comprehensio n	Applicati on	outcome s	l mar ks
I/1	Introduction to Quality Control.	04	08	04	MEF503.1	16
I/2	Quality Assurance.	05	05	04	MEF503.2	14
I/3	Quality Economics.	06	04		MEF503.2	10
II/4	Statistical Quality Control.	04	04	04	MEF503.3	12
II/5	TQM	04	04	06	MEF503.4	14
II/6	TQM Tools & Techniques.	04	04	06	MEF503. 5	14

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B. TERM WORK

Laboratory Exercises and related skills to be developed: The following Laboratory exercises shall be conducted as Term Work during the practical sessions of batches of about 22 students:

Sr. No.	Laboratory experience	Skills developed	Course outcomes
1.	Preparation of Histogram and	Student will get familiar to apply	MEF502.3
	calculation of standard deviation.	quality control techniques for the	
		analysis of process.	
2.	Preparation of X bar and R Chart.	Student will get familiar to apply	MEF502.3
		quality control techniques for the	

		analysis of process.	
3.	Preparation of 'p' and 'c' Chart.	Student will get familiar to apply quality control techniques for the analysis of process	MEF502.3
4.	Case study on Process Capability	Students will calculate process capability of a machine.	MEF502.3
5.	Study of ISO9000 series.	To know significance of ISO9000.	MEF502.5
6	Case study of Kaizan	To develop skills in Quality Techniques	MEF502.4
7	Case study of Six Sigma	To develop skills in Quality Techniques	MEF502.5
8.	Visit to industry to study Quality Tools and Techniques	Students will learn hands on experience.	MEF502.3

C. INDUSTRIAL EXPOSURE :

Included in experiment no. 8

D. ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION a) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria.

b) Progressive Skill Test : One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria

c) Term-Work Examination (Internal) :

Term-Work Examination (Internal) shall be conducted as per the following criteria:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	4
2	Preparedness for practical	4
3	Correct figures / diagrams	6
4	Observation tables	3
6	Result table / calculations / graphs	6
6	Safety / use of proper tools	2
		25

Final Assessment of Term Work Examination shall be done as per Pro-forma III.

E. INSTRUCTIONAL STRATEGIES:

- 1) Lectures and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources, including references:

- 1) Chalk-board.
- 2) Demonstrative kits.

3) Demonstrative charts.

F. REFERENCE MATERIAL: a) Books

Sr. No	Author	Title	Publisher
1	R.C. GUPTA	Statistical quality control	Tata Mc Graw Hill.
2	Grant	Statistical quality control	New Age Publication.
3	Ed. Robert Peach	ISO9000 Hand book	Tata Mc Graw Hill.
4	Furan & Grayna	Quality control	Prentice Hall Publication.

COURSE ID:

Course Name	: INDUSTRIAL ENGINEERING
Course Code	: MEF503
Course Abbreviation	: FIEG

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <*nil* >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme :

Modelof	Progressiv	ve Assessment	Term End H	Examination	
Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	3.25 marks for each practical4.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25	125

RATIONALE :

Productivity is dependent on the productivity of the machines and the people in the manufacturing system. A Technician is required to work at the highest Productivity level. Hence he should learn the techniques for improvement in productivity. A technician required to plan the production schedule accordingly organize material supply for the manufacturing activities. The total cost of goods produced contains large portion of overhead cost. Technician is required to minimize the direct and indirect cost by optimizing the use of resources available to him. Hence he should learn inventory control and process planning. Modern manufacturing systems employed in industry such as JIT, TPM, FMS, 5'S'and'Kaizen' which should be known to the technician.

COMPETENCY

Improve productivity of organization through various teaching learning experiences.

Cognitive : Use productivity improvement techniques.

Psychomotor : i) Plant layout preparation ii) Design of material handling system iii) Standard time calculation **Affective :** Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

COURSE OUTCOMES :

MEF503.1 Evaluate different production systems and techniques of improving productivity.

MEF503.2 Select suitable Plant layout, material handling devices and plant facilities.

MEF503.3 Prepare process chart for analysis of existing process and improve the process.

MEF503.4 Design simple jigs and fixtures.

MEF503.5 Calculate economic order quantity (EOQ).

MEF503.6 Calculate standard time for a job.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
0	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
Competency	Basic	Discipli	Experim	Enginee	The	Environ	Ethics	Individu	Commu	Life-	Learner	Start
Cos	knowled	ne	ents and	ring	engineer	ment		al and	nication	long	will be	entrepren
003	ge	knowled	practice	Tools	and	and		team		learning	able to	eurial
		ge			society	sustaina		work:			work in	activity
						bility					various	in the
											sectors.	Mechanic
												al Enginoari
												ng field
Competences		-		-								ing menu
Competency:		3	-	2	-	-	-	-	-	-	3	1
MEF503.1		3	-	2	-	-	-	-	-	-	3	1
MEF503.2		3	-	2	-	-	-	-	-	-	3	1
MEF503.3		3	-	2	-	-	-	-	1	-	3	1
MEF503.4		3	-	2	-	-	-	-	-	-	3	1
MEF503.5		3	-	2	-	-	-	-	-	-	3	1
MEF503.6		3		2							3	1

CONTENT :

U) THEORY:

SECTION -I

Sr. No.	Topics	Lectures (Hours)	Theory evaluation Marks
	MEE503.1 Evaluate different production systems and techniques of impr	oving produ	ctivity.
1.	 Production System 1.1 Production - Definition , Types of production systems 1.2 Productivity - Importance , Measurement of Productivity , 1.3 Techniques of improving productivity 1.4 Elements of cost- Fixed cost, Variable Cost. 1.5 Break even analysis, Calculation of Breakeven point. 	04	06
	MEE503.2Select suitable Plant layout, material handling devices an	nd plant fac	ilities.
2.	 Plant location, Plant layout and Material Handling 1.3 Plant Location - Importance of Site Selection, Factors affecting Site Selection, Government Policies, relaxation for Backward Areas. 	08	14

-			1
	1.4 Plant Layout - Objectives, types, design principles,		
	characteristics of Plant Layout, Symptoms of Bad Plant Layout.		
	2.3 Group technology, Cellular layout,		
	2.4 Material handling – Need, Principles and Types of material		
	handling devices – conveyors, Hoist & cranes, forklift		
	truck, trolleys, Pipes, Automated Guided Vehicles (AGV's)		
	Selection of Material Handling systems and Devices.		
Μ	EE503.3Prepare process chart for analysis of existing process and i	mprove the	process.
3.	Process Planning	08	10
	3.1 Planning of Processes from raw material to finished product,		
	Factors affecting Process Planning,		
	3.2 Deciding sequence of operations. Operation Sheet.		
	Combined operations, Determination of Inspection Stages.		
	3.3 Selection of Machine		
	3.4 Techniques of assembly planning. Types of assembly.		
	3.4 Plant Capacity, Machine Capacity, Plant Efficiency.		
	Numericals not to be asked,		
	, 		
4.	Production Planning and Control	04	10
	4.1Routing, Sequencing [n job 2 machines],		
	4.2 Scheduling, Dispatching,		
	4.3 Meaning of Control, Progressive Control, Gantt chart.		
	4.4 Concept of Line balancing,		
	Total	24	40
Seme	ster end exam question paper should be such that total marks of questions	s on each top	bic is one and
half ti	mes the marks allotted above but the candidates are able to attempt quest	ions of the a	bove allotted
marks	sonly		
man	· •····		

SECTION II

Sr. No.	Topics / Sub - topics	Lectures (Hours)	Theory evaluation (Marks)
	Course Outcome MEE503.4 Design simple jigs and fixtur	es.	
5.	Jigs and Fixtures	05	08
	5.1 Introduction. Difference between jig and fixture		
	Different components of Jig/ fixture		
	5.2 Types of locators and clamping devices, 3-2-1 principle of		
	location.		
	5.3 General principles of jig/fixture design.		
	5.4 Types of jigs and fixtures.		
	5.5 Design of simple jigs and fixture.		
	Course Outcome MEE503.5 Calculate economic order quantity	v (EOQ).	
6.	Inventory Control	05	08
	6.1 Methods of Inventory Management, Inventory Cost		
	relationship,		
	6.2 Deciding Economic Batch Quantity, EOQ Model,		

Calculation of EOO		
6.3 Concepts of discounts		
6.4 Introduction of Material Requirement Planning.		
6.5 Stores Function – Storage systems – One bin , Two bin		
System, Material issue request (MIR), bin card.		
Course Outcome MEE503.6 Calculate standard time for a	job.	
7. Work Study	09	16
7.1 Method Study- Objectives, Procedure, Selection of work.		
7.2 Recording Techniques - Outline process chart, Flow		
process chart, Two Hand process chart, Multiple activity		
chart, Flow diagram, String diagram, Travel chart.		
7.3 Micro motion study-Critical Examination, Principles of		
Motion Economy.		
7.4 Concept of ergonomics and workplace layout.		
7.5 Work Measurement -Objectives, procedure		
7.6 Time Study - Time Study Equipments, Allowances,		
Calculation of Standard Time,		
7.7 Work Sampling, Analytical Estimating, Predetermined		
Motion Time Study (PMTS),		
7.8 Concept of Merit Rating		
8. Modern Trends	05	08
8.1 Just In Time manufacturing – Pull and push types of		
Manufacturing systems,		
8.2Waste reduction, 5'S', inventory reduction, single piece		
Production systems. Concept of continuous improvement		
(Kaizen) – DMIAC cycle,		
8.3 Brain storming. Poka Yoke.		
8.4 Concept of Flexible manufacturing system		
8.5 Concept of Rapid Prototyping		
Total	24	40
Semester end exam question paper should be such that total marks of questions	on each top	ic is one and
half times the marks allotted above but the candidates are able to attempt quest	ions of the a	bove allotted
marks only.		

Specification table for setting question paper for semester end theory examination :

Topi c No.		Distribution o	f marks (Cognitive lev	vel-wise)	Course	Total
	Name of topic	Knowledge	Comprehension	Applic ation	Outcome	Marks
1	Production System	02	02	02	MEE503.1	06
2	Plant location, Plant layout and Material Handling	04	04	06	MEE503.2	14
3	Process Planning	02	04	04	MEE503.3	10

4	Production Planning and Control	04	04	02	MEE503.3	10
5	Jigs and Fixtures	02	02	04	MEE503.4	08
6	Inventory Control	02	02	04	MEE503.5	08
7	Work Study	04	04	08	MEE503.6	16
8	Modern Trends	02	04	02	MEE503.6	08
TOTAL		22	26	32		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

V) TERM WORK Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Selecting a plant location for a desired product.	Select a site using various considerations	MEE503.1
2	Design a plant layout for above product on selected location on sheet.	Design of plant layout Drawing of layout	MEE503.2
3	Design a material handling system suitable for above plant and show on sheet.	Design of material handling system	MEE503.2
4	Prepare process planning sheet of a selected product.	Preparation of process sheet Make Sequence of operations Line balancing	MEE503.3
5	Prepare record using suitable charts for selected product.	Preparation of process charts for recording	MEE503.3
6	Prepare scheduling using Gantt chart	Preparing Gantt chart	MEE503.3
7	Design Jig or fixture for production of above product.	Design of jig/fixture Applying 3-2-1 principle of locating a job	MEE503.4
8	Design inventory control system for production of above product.	Use Inventory control techniques Calculate EOQ Drawing break even chart	MEE503.5
9	Calculate standard time for manufacturing of above product	Calculate standard time Adding allowances	MEE503.6
10	Apply modern management technique for improving productivity of selected product	Applying modern management technique	MEE503.6

W) INDUSTRIAL EXPOSURE :

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

- n. Follow safe practices
- o. Practice good housekeeping
- p. Practice energy conservation
- q. Maintain tools and equipment
- r. Follow ethical practices

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

p) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50	
Comitivo	Understanding	05	
Cognitive	Application	05	
Developmentor	Operating Skills	10	
Psychomotor	Drawing / drafting skills	10	
Affactiva	Discipline and punctuality	10	
Allective	Decency and presentation	10	
	TOTAL		

ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1	T R Banga, S C Sharma	Industrial Engineering &	Khanna Puplishers
		Management	
2	O.P. Khanna	Industrial Engineering	Khanna Puplishers
3	I.L.O	Introduction to work Study	Tata McGraw Hill
4	Introduction to Materials	Ray Siddhartha	NITTTR, Kolkata
	Handling		
5	Materials Handling	Raymond A Kulwiec	ASME and IMMS
	Handbook		

q) Websites

www.faro.com/plant-layout/building-survey

http://www.intergraph.com/learnmore/ppm/engineering-procurement-and-constru

* * *

COURSE ID:	
Course Name	:FOUNDRY TECHNOLOGY
Course Code	:MEF504
Course Abbreviation	:FFTL

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : Nil

Teaching Scheme :				
Scheme component Hours / week				
Theory	03	05		
Practical	02	05		

Evaluation Scheme :

	Progressiv	ve Assessment	Term I	End Examination	n	
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral examin ation (Ext)	Total
Details of Evaluation	Average of two tests of 20 marks each	3.25 marks for each practical4.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	As per Profor ma-I	
Marks	20		80		25	125

RATIONALE :

This subject will enable the students to understand principles behind designing a Gating system to produce a sound casting. This subject includes the considerations of designing a casting on the basis of systematic study of the various processes in the foundry.

COMPETENCY:

Produce a sound casting by applying principles of casting in the foundry.

Cognitive :Understand various functions in foundry.

Psychomotor :Operate various processes in Foundry and handle different situtions in Foundry practice.

Affective :Develop attitude of i) Team work ii) safety consciousness.

COURSE OUTCOMES:

MEF504-1 Develop the skill of casting method.

MEF504-2 Apply the principle of casting design.

MEF504-3 Analyze casting defect.

MEF504-4 Identify the foundry mechanization and apply in the foundry industry.

MEF504-5 Recognize the principle and functions in foundry management.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

Competency		Programme Outcomes Pos and PSOs										
and Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	Basic	Discipli	Experiment	Engineer	The	Environm	Ethics	Individua	Commu	Life-long	Workin	Start
	knowle	ne	s and	ing Tools	engineer	ent and		l and	nication	learning	Mfg. &	entrepr
	dge	knowle	practice		and	sustainabi		team			Service	eneuria
		age			society	nty		work:			sector	ı activity
Competency:	3	3	3	2	2	1	3	3	3	2	3	3
MEF504-1	3	3	3	3	2	2	2	3	2	3	3	3
MEF504-2	3	3	3	2	-	-	-	-	-	3	3	3
MEF50-3	3	3	3	1	-	-	-	2	-	2	3	3
MEF504-4	3	1	1	2	2	2	2	-	-	3	3	3
MEF504-5	3	1	1	2	-	-	-	-	-	3	2	3

CONTENT :

D) THEORY :

Section I

Sr. No.	Topics / Sub-topics		Theory Evaluation (Marks)
Course (DutcomeMEF504-1 Develop the skill of casting method.		
1	GATING	06	12
	1.1 Elements of gating system,		
	1.2 Fundamentals of fluid flow, Bernoulli's Theorem,		
	1.3 Design of gating system, Types of gates,		
	1.4 Slag trap & filters with different cast metals and alloys.		
	1.5 Methoding of casting, pouring time calculation, Choke area		
	calculation, Size calculation of pouring basin,		
	1.6 Sprue, Runner & Ingates, Slag trapping arrangements.		
Course (Dutcome MEF507-1 Develop the skill of casting method.		
2.	RISERING	06	08
	2.1 Design of feeding system (Risers),		
	2.2 Requirement and positioning of risers,		
	2.3 Range of feeding,		
	2.4 Feeding efficiency,		
	2.5 Riser design by Caine's method,		
	2.6 NRL method, Modulus method, Feeding distances.		
Course (DutcomeMEF504-2 Apply the principle of casting design.		
3	SOLIDIFICATION OF CASTING	08	12
-	3.1 Controlled solidification or directional solidification, Progressive		
	solidification,		
	3.2 difference in quality of casting due to directional & progressive		
	solidification,		
	3.3 Methods of achieving directional solidification,		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)	
Course (DutcomeMEF504-1 Develop the skill of casting method.	•		
	3.4 Effect of gating system &risers in achieving directional solidification,3.5 Use of chills, padding, exothermic material to achieve Directional solidification.			
Course (DutcomeMEF504-2 Apply the principle of casting design.	•		
4	 INTRODUCTION TO CASTING DESIGN 4.1 Casting design aspects- design for economic moulding, 4.2 Design for overall manufacture, 4.3 Design problem related to sections/design of die casting- 4.4 Design fundamentals. 	04	08	
	Total	32	40	
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.				

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course (DutcomeMEF504-3 Analyze casting defect.		
5 Course (CASTING DEFECTS ANALYSIS 5.1 Parameters responsible for casting defects: Design of casting & pattern, pattern & core box equipment, moulding and core making equipment, gating and risering, moulding sand and core sand, melting and metallurgy, pouring, fettling and heat treatment. 5.2 Casting Defects: a) Gas defect- pin holes, blow holes, tears. b) Shrinkage defects- primary and secondary shrinkage, shrinkage, porosity. c) Metallurgical defects- hard spots, chilling, inverse chill, open grain, porosity. d) Defects related to sand practice and gating system –scab, cuts and washes, inclusion, swelling, rough surface, fusion, penetration. e) Mis run and cold shut. f) Mechanical defects- crush, drop, run out shift, flashes. g) Misc-Defects- short pours, leakage etc. 5.3 Analytical approach for trouble shooting- 5.4 Keen observations, importance of records and documentation, importance of process controls. 5.5 Salvaging castings, impregnation. 	12 in the	24
Jounary	INAUSTRY.	0.6	
6	 6.1 Mechanical equipments in foundry, 6.2 Sand handling & conveying, 6.3 Moulding machines, mechanical equipment for finishing, 6.4 Foundry layout for small, medium scale & large scale foundries, 	06	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	6.5 Safety and Accident prevention.		
Course (Dutcome MEF504-5 Recognize the principle and functions in found	lry	
manage	ment.		
7	FOUNDRY MANAGEMENT	06	08
	7.1 Principles & Functions of Management, incentive schemes,		
	7.2 Quality consciousness through quality circle program, 7.3		
	Production planning & control, value analysis		
	7.4 Material Management: Integrated approach, Organizations and		
	functions of purchase and store, Control of stores, Inventory control,		
	Vendor development-Terms of contract.		
	Total	32	40
Semester marks all	end exam question paper should be such that total marks of questions on each	topic is one an l marks only	d half times the

Specification table for setting question paper for semester end theory examination:

Торіс		Distributio	n of marks (Cogni wise)	Course	Total	
No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Marks
I/1	Gating	08	02	02	MEF504-1	12
I/2	Risering	04	02	02	MEf504-1	08
I/3	Solidification of Casting	06	04	02	MEF504-2	12
I/4	Introduction to Casting Design	04	02	02	MEF504-2	08
II/5	Casting Defects Analysis	16	04	04	MEF504-3	24
II/6	Foundry Mechanization	02	02	04	MEF504-4	08
II/7	Foundry Management	02	02	04	MEF504-5	08
TOTAL		30	32	18		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

E) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual forApplied Mechanics* developed by the Institute in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Design calculations for methoding data	Calculations for sprue, runner ,ingrate	MEE504-1
2	Design calculations for methoding data	Calculations for sprue, runner ,ingrate	MEE504-2
3	Design calculations for methoding data	Calculations for sprue,runner ,ingrate	MEE504-2
4	Drawing a layout for a small, medium	To understand the layout of the various	MEE504-3
5	Guidelines for design of casting.	Ro understand the suitable designs for the	MEE504-3

C. INDUSTRIAL EXPOSURE :

Visit to a mechanized foundry in local industrial area.

D. ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given in *Proforma-I*

Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted.

Term-end Oral Examination (External) :

Term-end Oral Examination (External) shall be conducted as per the following criteria:

:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	3
2	Preparedness for oral	5
3	Correct figures / diagrams	5
4	Observation tables	5
5	Result table / calculations / graphs	5
6	Safety / use of proper tools	2
		25

Final Assessment of Oral Examination shall be done as per Pro-forma I.

E. INSTRUCTIONAL STRATEGIES

Instructional Methods :

- a. Lectures cum Demonstrations
- b. Classroom practices
Teaching and Learning resources :

- F. Chalk board
- G. LCD presentations
- H. Audio presentations
- I. Item Bank

F. REFERENCE MATERIAL :

a) Books

Sr			
No.	Author	Title	Publisher
1	. P.C.Mukherji	Fundamentals of Metals and Casting	Oxford & IBH Pub. Co
2	. T RamanaRao	Metal casting principles and Practices	New Age International
3	. <u>R. Wlodawer</u>	Directional Solidification of Steel Casting	Elsevier
4	. P.N. Rao	Manufacturing Technology - Forming, Foundry and Welding	Tata McGraw-Hill Education
5	Heine, Loper& Rosenthal	Principles of Metal Casting	Tata McGraw-Hill Education

J. Websites

- a. <u>http://www.nkn.in/efoundry.php</u>
- b. <u>http://www.indianfoundry.org/</u>
- c. <u>http://www.nifft.ernet.in/</u>

COURSE ID : Course Name : REFRIGERATION AND AIR CONDITIONING Course Code : MEF504 Course Abbreviation : FRAC

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : NIL

Teaching Scheme :		
Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme :

	Progressiv	e Assessment	Term I	End Examination	n	
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral examin ation (Ext)	Total
Details of Evaluation	Average of two tests of 20 marks each	5.25 marks for each practical6.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	As per Profor ma-I	
Marks	20		80	25	25	125

RATIONALE :

This subject is classified as an Applied Technology. The 21_{st} century predicts revolutionary developments in Refrigeration and Air Conditioning. Refrigeration and Air conditioning is one of the most meaningful job areas for diploma holders in Mechanical Engineering. Considering the wide and increasing use of Refrigeration and Air conditioning for domestic, commercial and industrial applications and the challenges put by the use of Refrigeration and air conditioning equipments in existing stage, it is absolutely necessary that Diploma Engineers should learn this subject. They should know the processes, equipments, systems of Refrigeration and Air Conditioning with their functioning, maintenance, repairs and measures to meet the challenges of the near future in this area. The Knowledge of Thermal Engineering and Power Engineering is a prerequisite for this subject.

COMPETENCY :

Identify and describe refrigeration and air conditioning systems and their practical applications

Cognitive :Understand construction and working principle of refrigeration and air conditioning systems

- **Psychomotor :**Conduct trial on different refrigeration and air conditioning systems to evaluate their performance
- Affective :Attitude towards; i) Analyse and solve thermal load requirements ii) Safety in handling refrigerants iii)Environment and Sustainability iv) Interpret Charts

COURSE OUTCOMES:

MEF505.1Understand basics of refrigeration and its various methods **MEF505.2**Describe types, working principles and construction of refrigeration and airconditioning systems

MEF505.3Enlist properties of refrigerants, their applications and effects on environment **MEF505.4**Describe and select various components of vapour compression refrigeration system

MEE505.5Apply values of different psychrometric properties using charts and tables for refrigeration and air-conditioning systems

MEE505.6 Estimate cooling and heating loads

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

		Programme Outcomes POs and PSOs										
Competenc y and Cos	PO 1 Basic knowle dge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commu nication	PO 10 Life- long learnin g	PSO1 Work in mfg& service sector	PSO 2 Start entrepre neurial activity
Competenc y:	2	3	3	2	2	2	1	2	2	3	3	3
MEE505-1	2	3	1	1	-	1	-	-	-	3	3	3
MEE505-2	2	3	3	2	1	2	-	1	-	3	3	2
MEE505-3	3	3	3	2	-	2	-	3	2	3	3	3
MEE505-4	3	3	3	2	-	2	-	3	2	3	3	3
MEE505-5	2	3	1	2	-	3	3	1	1	3	3	3
MEE505-6	3	3	3	2	-	2	-	3	2	3	3	3

CONTENT :

F) THEORY:

Section I

Sr. No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cour	rse OutcomeMEF505.1 Understand basics of refrigeration and its var	ious methods	
1	BASICS OF REFRIGERATION	04	10
	1.1 History and Need of refrigeration.		
	1.2Methods of refrigeration: Ice refrigeration, Refrigeration by		
	expansion of air, Refrigeration by throttling of gas, Vapour refrigeration		
	system, Steam jet refrigeration system, Non-conventional methods of		
	refrigeration like Vortex tube, Pulse tube refrigeration, solar		
	refrigeration.		
	1.4 Concept and comparison of heat engine, heat pump and Refrigerator.		
	1.5 Unit of refrigeration, C.O.P. and refrigerating effect.		
	1.6 Major application areas of R.A.C. like domestic, commercial and		
	industrial.		

Sr. No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
Cour	rse OutcomeMEF505.1 Understand basics of refrigeration and its var	ious methods			
Cour	se Outcome MEF505.2 Describe types, working principles and con	nstruction of	refrigeration		
and	and air-conditioning systems.				
2.	REFRIGERATION CYCLES	08	12		
	2.1 Reversed Carnot Cycle and its representation on P-V and T-S				
	diagram.				
	2.2 Air Refrigeration Cycles: Bell Coleman air refrigerator, it's				
	representation on P-V and T-S diagram, Necessity of air craft cooling				
	and types. (Simple numerical on Reversed Carnot cycle.)				
	2.3 Vapour Compression Cycle (V.C.C): Principle, components,				
	Representation on P-H and T-S diagram, effects of wet compression, dry				
	compression, calculation of COP, Effect of superheating, under cooling,				
	suction pressure and discharge pressure, Actual V.C.C., (simple				
	numerical),				
	Methods of improving COP(no description).Introduction to multistage				
	V.C.C., its necessity, advantages.				
	2.4 Vapour Absorption system: Principle, components and working of				
	aqua- ammonia system (simple & practical), Li-Br Absorption System,				
	Electrolux Refrigeration System,				
	2.5 Comparison of above Refrigeration Cycles.				
Cour	se Outcome MEF505.3 Enlist properties of refrigerants, their ap	oplications a	nd effects on		
envi	ronment		1		
3	REFRIGERANTS	02	04		
	3.1 Classification of refrigerants.				
	3.2 Desirable properties of refrigerants.				
	3.3 Nomenclature of refrigerants.				
	3.4 Selection of refrigerant for specific applications.				
	3.5 Eco-friendly refrigerants like R-134a, hydrocarbon refrigerants Etc.				
Cour rofri	se OutcomeMEF505.4 Describe and select various components aeration system	s of vapour	compression		
10/11	geration system	10	14		
4	EQUIPMENT SELECTION	10	14		
	4.1 Components of Vapour Compression Refrigeration System				
	4.2 Compressors: Classification, Construction and working of open				
	type, hermetic, centrifugal, rotary, screw and scroll compressor and their				
	applications.				
	4.3 Condensers: Classification, description of air cooled and water				
	cooled condensers, comparison and applications. Evaporative				
	condensers.				
	4.4 Expansion devices: Types, Capillary tube, automatic and				
	thermostatic expansion values and their applications.				
	4.5 Evaporators and chillers: Classification of evaporators				
	construction and working of Bare tube, Plate surface, finned, shell and				
	tube, flooded and dry expansion evaporator, Capacity of evaporator and				
	their applications, Classification of chillers, Construction and working of				
	dry expansion Chillers and flooded chillers and their applications.				

Sr. No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)	
Cour	rse OutcomeMEF505.1 Understand basics of refrigeration and its var	ious methods		
	4.6 High pressure and low pressure cutouts			
	4.7 Selection criteria for Vapour compression refrigeration system			
	components for the following applications: Water coolers, ice plants,			
	cold storage, domestic refrigerator .			
	Total	32	40	
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the condidates are able to attempt questions of the above allotted marks only				

Section II

Sr. No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cour	rse OutcomeMEF505.5 Apply values of different psychrometric pr	operties usin	g charts and
table	es for refrigeration and air-conditioning systems		
5	PSYCHROMETRY	08	12
	5.1 Definition and necessity of air conditioning.		
	5.2 Properties of Air, Dalton's law of partial pressure.		
	5.3 Psychrometric chart.		
	5.4 Psychrometric processes, Bypass Factor, ADP, concept of SHF, RSHE FRSHE GSHE		
	5.5 Adiabatic mixing of Air streams		
	5.6 Simple numerical using Psychometric chart		
	5.7 Equipments used for Air- conditioning like humidifier, dehumidifier.		
	filter, heating and cooling coils.		
Cour	se Outcome MEF505.6 Estimate cooling and heating loads		
6	COMFORT CONDITIONS AND COOLING LOAD	04	10
Ū	CALCULATIONS	•	10
	6.1 Thermal exchange of body with environment		
	6.2 Factors affecting human comfort		
	6.3 Effective temp. and comfort chart		
	6.4 Components of cooling load- sensible heat gain and latent heat gain		
	sources		
Cour	rse Outcome MEF505.2 Describe types, working principles and construct	ion of refrige	ration and air-
cond	itioning systems.		
7	AIR- CONDITIONING SYSTEMS	06	10
	7.1 Classification of A.C. systems		
	7.2 Industrial and commercial A.C.systems		
	7.3 Summer, winter and year round A.C.systems		
	7.4 Central and unitary A.C. systems		
	7.5 Application areas of A.C. systems		

Course Outcome MEF505.2 and air-conditioning system. 8 AIR DISTRIBUTION S 8.1 Duct systems: Close radial duct system, duct r in ducts 8.2 Fans and Blowers: 7 distribution outlets: Supp	2 Describe types, working principles and cons.	nstruction of	^r refrigeration				
8 AIR DISTRIBUTION S 8.1 Duct systems: Close radial duct system, duct n in ducts 8.2 Fans and Blowers: 7 distribution outlets: Supp		<i>Course Outcome MEF505.2</i> Describe types, working principles and construction of refrigeration and air-conditioning systems.					
8.4 Insulation: Purpose, insulating materials, met	SYSTEMS sed perimeter system, extended plenum system, a materials, requirement of duct materials, losses Types, working of fans and blowers 8.3 Air oply outlets, return outlets, grills, diffusers e, properties of insulating material, types of ethods of applying insulation.	06	08				
Total		32	40				

Specification table for setting question paper for semester end theory examination :

Торі		Distribution of marks (Cognitive level-wise)			Course	Total
c No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Mark s
1	Basics Of					
1	Refrigeration	04	02	04	MEF505.1	10
2	Refrigeration Cycles	06	04	02	MEF505.2	12
3	Refrigerants	02	02	02	MEF505.3	04
4	Equipment Selection	04	02	06	MEF505.4	14
5	Psychrometry	04	06	02	MEF505.5	12
6	Comfort Conditions And Cooling Load calculations	04	04	02	MEF505.6	10
7	Air- Conditioning Systems				MEF505.2	
8	Air Distribution Systems	04	04	02	MEF505.2	10
TOTAL		02	02	02		08

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

G) TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual* developed by the Institute in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Trial on water cooler test rig.	Identify various components of refrigeration system and equipment, and calculate coefficient of performance.	MEE505.2
2	Trial on ice plant test rig.	Identify various components of refrigeration system and equipment, and calculate coefficient of performance.	MEE505.2
3	Visit to cold storage.	Observe working of Cold MEE Storage.	
4	Demonstration of domestic refrigerator in View of construction, operation and controls used.	Identify various components of refrigeration system.	MEE505.4
5	Demonstration of various controls like L.P./H.P. cut outs, thermostat, overload protector, solenoid valve used in RAC.	Handle various controls used for refrigeration and air conditioning plant safety.	MEE505.4
6	Identification of components of hermetically sealed compressor.	Identify various components of hermetically sealed compressor.	MEE505.4
7	Visit to repair and maintenance workshop in view of use of various tools and charging procedure.	Handle various tools used for refrigeration and air conditioning plant maintenance.	MEE505.6
8	Cooling load calculations for cabin, classrooms, laboratory, canteen and dairy plant, milk storage, small freezers (minimum one).	Analyze cooling load based on application. Interpret psychometric chart to find various properties of air.	MEE505.6
9	Trial on A.C. test rig.	Observe working of A.C. test rigs.	MEE505.2
10	Visit to central A.C. plant in view of ducting system, insulation system and Air distribution system (e.g. frozen food industry/ice- cream industry/mushroom plants/textile industries).	Observe working of central A.C. plant in view of ducting system, insulation system and Air distribution system.	MEE505.6
11	Trouble shooting of domestic refrigerator/window air- Conditioner.	Repair and Maintenance of domestic refrigerator/window air- Conditioner.	MEE505.6

INDUSTRIAL EXPOSURE :

Included in experiment no. 3, 7 & 10.

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

Continuous Assessment of Practical Assignments : Every practical assignment shall be assessed for 25 marks as per criteria. given in Proforma-I

Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Proforma-I*

Term-end Oral Examination (External) :

Term-end Oral Examination (External) shall be conducted as per the following criteria:

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	3
2	Preparedness for oral	5
3	Correct figures / diagrams	5
4	Observation tables	5
5	Result table / calculations / graphs	5
6	Safety / use of proper tools	2
	Total	25

Final Assessment of Oral Examination shall be done as per Pro-forma I.INSTRUCTIONALSTRATEGIES:

Instructional Methods:

Lectures cum Demonstrations Classroom practices

Teaching and Learning resources:

Chalk board LCD presentations Audio presentations

F.REFERENCE MATERIAL:

a) Books

Sr. No	Author	Title	Publisher
01	R.S.Khurmi	Refrigeration and Air	S.Chand and Co
		Conditioning	
02	Arrora and Domkundwar	Refrigeration and Air	DhanpatRai and Sons
		Conditioning	
03	Manohar Prasad	Refrigeration and Air	New Age Publications
		Conditioning	
04	P.N.Ananthanarayanan	Refrigeration and Air	Tata McGraw Hill
		Conditioning	
05	Roy Dossat	Principles of Refrigeration	Pearson Education
06	Edwin P. Anderson	Commercial Refrigeration	Taraporevala Sons &
			Со

b) Websites

http://www.alephzero.co.uk

http://www.brighthubengineering.com

http://en.wikipedia.org/wiki/Duct_(HVAC)

COURSE ID:

Course Name	: AUTOMOBILE ENGNEERING
Course Code	: MEF506
Course Abbreviation	: FAEG

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme:

	Progressive Assessment		Term			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External))	Total
Details of Evaluation	Average of two tests of 20 marks each	i.25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-I	
Marks	20		80		25	125

RATIONALE :

Automobile Engineering a technology subject helps to meet the need of automotive industry for specialized technicians. Due to liberalization of industrial policy in India, major global players in Automobile sector have launched their product in India. It is a key driver of countries economy. It has major employment potential for diploma holders. Automobile servicing in particular offers good job opportunities at village, town and city level. Thus helps to generate self employment in country.

COMPETENCY :

Identify and describe the functions of various automobile systems and their parts.

Cognitive : Understand constructional features and working principle of various automobile systems **Psychomotor :** Inspect, identify and troubleshoot automobile problems

Affective : Develop attitude towards (i) Safety (ii)Punctuality in maintenance schedule

COURSE OUTCOMES:

MEF506.1Classify automobile systems and describe automotive sub systems

MEF506.2 Explain the functions of transmission systems

MEF506.3 Understand functional requirements of control systems of automobile.

MEF506.4 Understand suspension system and chassis of automobile

MEF506.5List various automobile electrical systems and show electrical and electronic circuit path arrangement

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

		Programme Outcomes POs and PSOs										
Competenc y and Cos	PO 1 Basic knowl edge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustainab ility	PO 7 Ethics	PO 8 Individu al and team work	PO 9 Commun ication	PO 10 Life- long learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepre neurial activity
Competenc y:	2	3	3	2	3	-	-	-	-	3	3	2
MEE402-1	2	1	2	2	-	-	-	2	-	3	3	2
MEE402-2	3	1	1	3	1	-	-	-	-	3	3	3
MEE402-3	2	3	2	3	-	-	-	2	-	3	3	2
MEE402-4	3	3	2	3	1	-	-	-	-	3	3	1
MEE402-5	2	3	2	2	-	-	-	1	2	3	2	1

CONTENT:

A. THEORY :

SECTION-I

Sr. No.	Topics / Sub-topic	Teaching (Hours)	Theory Evaluation Marks
1. Cours	INTRODUCTION OF AUTOMOBILE 1.1 Classification of automobiles 1.2 Vehicle layout & types 1.3 Body construction:Types & Nomenclature of car body 1.4 Introduction to aerodynamic body shapes 1.5 Safety feature in car Adaptive cruise control, Forward collision avoidance system, Autonomous braking, Adaptive headlights, Backup camera, Reverse backup sensors, Side view assist, Parking assist re OutcomeMEF506.2 Explain the functions of transmission systems	04	06
2	 AUTOMOBILE TRANSMISSION 2.1 Clutch: Necessity, construction & working of coil spring & diaphragm spring type clutch. 2.2 Gear Box: Tractive effort and tractive resistance, Types of G.B construction & working of constant mesh G.B., & synchromesh G.B., Epicyclic G.B., Torque converter, Overdrive, Transfer case 2.3 Final drive: Necessity, construction & working of Propeller shaft & differential. 	12	20

Sr. No.	Topics / Sub-topic	Teaching (Hours)	Theory Evaluation Marks				
Cours	Course OutcomeMEF506.1 Classify automobile systems and describe automotive sub systems						
	2.4 Axle-Type of rear axles, front axles & their applications						
3.	 CONTROL SYSTEMS 3.1Steering system- Requirement of steering system. Construction and working of steering linkage. Steering gear box- construction & working of rack and Pinion, recirculating ball type gearbox. Introduction to Power steering, 3.2 Steering geometry: Camber, caster, toe-in, toe-out, Kingpin inclination & their effects. 3.3 Brake system: Construction & working of hydraulic & Pneumatic brakes. Comparison of disc & drum brake. 	08	14				
	TOTAL	24	40				
Sen times	nester end exam question paper should be such that total marks of questions on ea the marks allotted above but the candidates are able to attempt questions of the a	hch topic is of bove allotted	ne and half marks only.				

SECTION-II

Sr. No.	Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks
Cours	se OutcomeMEF506.4 Understand suspension system and chassis of automo	obile	
4	 SUSPENSION SYSTEMS, 4.1Necessity & classification of suspension system. 4.2 Working & construction of Leaf spring, rigid axle suspension. 4.3 Introduction to air suspension 4.4 Construction & working of McPherson & wishbone, trailing link suspensions. 4.5 Construction & working of telescopic shock absorbers. 	08	12
5	 WHEELS AND TYRES 5.1 Construction & working of spoked wheel, disc wheel & light alloy cast wheel. 5.2 Types of rims, their construction & working. 5.3 Construction, working & comparison of radial, cross- ply and tube, tubeless tyre & tyre specifications 5.4 Factors affecting tyre life 5.5 Wheel Alignment and Balancing 	08	12

Cours	e OutcomeMEF506.5 List various automobile electrical systems and	show ele	ectrical and			
	electronic circuit path arrangement					
	AUTOMOBILE ELECTRICAL SYSTEMS	08	16			
6	6.1 Battery: Working, Construction & Rating of battery.					
	6.2 Ignition system: Construction & Working of electronic and					
	CDI ignition system.					
	6.3 Starting system: Construction & Working of starting motor.					
	6.4 Charging system: Construction & Working of alternator					
	6.5 Wiring system: Harnessing & colors codes.					
	6.6 Lighting system: Head light, Tail light, Indicator light &					
	their circuits.					
	6.7 Gauges: Construction & Working of Fuel level gauge, oil					
	gauge and water temperature gauge.					
	6.8 Use of microprocessor in automobile control systems					
	TOTAL	24	40			
Semester end exam question paper should be such that total marks of questions on each topic is one and half						
times	the marks allotted above but the candidates are able to attempt questions of the ab	ove allotted	l marks only.			

Specification table for setting question paper for semester end theory examination:

Section /		Distrib	ution of marks (lev	Course	Total	
Topic no.	Name of topic	Knowledge	Comprehension	Applicatio n	outcome	marks
I/1.	Introduction of Automobile	04	02	-	MEF506.1	06
I/2.	Automobile Transmission	04	08	08	MEF506.2	20
	system.					
I/3.	Control System.	02	06	06	MEF506.3	14
II/4.	Suspension System	04	04	04	MEF506.4	12
II/5.	Wheels and Tyres.	04	04	04	MEF506.4	12
II/6.	Automobile Electrical	04	06	06	MEF506.5	16
	System					
				Total		80

B. TERM WORK

Practical Exercises and related skills to be developed: The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr. No.	Laboratory experience	Skills developed	Course outcome
1.	Introduction & demonstration of use of various tools Instruments & equipments used in Automobile service station.	Able to select tools and equipments, understand proper handling of tools.	MEF506.1
2.	Carrying out preventive maintenance of four wheeler/two wheeler as per manufacturer's specifications.	Able to use service manual .adopt the recommended procedure for maintenance, testing etc.	MEF506.1

3.	Demonstration of single plate coil spring & diaphragm spring type clutch.	Able to observe various components of clutch, Construction of clutch. able to inspect & trouble shoot the problem in clutch.	MEF506.2
4.	Demonstration of synchromesh gear box.	Able to observe various components of synchromesh gear box. Inspect the gear box for probable troubles & find remedy on it.	MEF506.2
5.	Demonstration of differential gear box.	Able to observe various components of differential, understand function of each components, their constructional details.	MEF506.2
6.	Demonstration of rack & pinion steering box.	Able to understand function & working of steering box.	MEF506.3
7.	Demonstration of hydraulic brake system.	Able to understand function & working of brake system.	MEF506.3
8.	Visit to four wheeler service station.	Understand sequence of service operations carried out in service station.	MEF506.4
9.	 Mini project- Title-Advances in Automobile Engg. such as MPFI,TPFC,VTEC, Use of microprocessor. Automobile fuels such as ethanol, biodiesel, Battery, solar, etc. 	Able to gain latest knowledge in this subject.	MEF506.1

C. INDUSTRIAL EXPOSURE :

- a) As perpractical no. 2 expert lectures by prominent personalities from industries.b) As per practical no. 8 an Industrial visit of students to service station.

D. ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

a) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per following criteria

Sr. No.	Criteria	Marks allotted
1	Quality and neatness of term work	05
2	Attendance	05
3	Participation	05
4	Understanding	05
5	Representation	05
	Total	25

b) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted as per criteria given in Proforma

c) Term-end Oral Examination :

Term-end Oral Examination shall be conducted as per the following criteria:

Sr. no	Criteria	Marks allotted
1	Attendance	08
2	Quality and neatness of term work	08
3	Participation	05
4	Result table / calculations / graphs	04
	Total	25

E. INSTRUCTIONAL STRATEGIES : Instructional Methods:

- 1. Lectures and discussions
- 2. Classroom practices
- 3. Laboratory experiences and laboratory interactive sessions
- 4. Experiences and discussions through industrial visits
- 5. Time bound assignments

Teaching and Learning resources:

- 1. Chalk board
- 2. Demonstrative kits
- 3. Demonstrative charts
- 4. LCD presentations
- 5. Audio presentations
- 6. Item Bank

F. **REFERENCE MATERIAL** :

a) Books

Sr. No.	Title	Author name
1)	Automobile engg. vol I & II	Kirpal singh
2)	Automobile engg.	GBS Narang.
3)	Automotive technology	H.M. Sethi.
4)	Automotive mechanics.	Crouse, Anglin.
5)	The Motor Vehicle	Newton Garrett.
6)	Automobile Engg.	K.K.Jain & R.B. Asthana.

b) Websites

1) http://chemwiki.ucdavis.edu

2) http://en.wikipedia.org

COURSE ID : Course Name :INDUSTRIAL HYDRAULICS AND PNEUMATICS Course Code : MEF507 Course Abbreviation : FIHP

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s)	: <nil></nil>
Teaching Scheme :	

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme:

	Progressiv	ve Assessment	Term			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External))	Total
Details of Evaluation	Average of two tests of 20 marks each	i.25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	As per Proforma-I	
Marks	20		80		25	125

RATIONALE :

Oil Hydraulic systems & pneumatic systems are widely used in all fields of engineering as clean source of motive power. Low cost automation systems with the use of pneumatics have become popular as manufacturing aids. Diploma engineers come across such systems in all segments of industries. Hence the subject will give the students basic skills and knowledge, which will be directly needed in the industrial environment.

COMPETENCY : Design and operate simple Industrial Hydraulics & Pneumatics circuits

Cognitive :-Identify various components of hydraulic and pneumatic systems. **Psychomotor :**Make connections as per circuit diagram to operate hydraulic and Pneumatics system

Affective :Attitude of i) Analytical Thinking ii) Safety iii) Selection

COURSE OUTCOMES :

MEF507.1-Recognize standard schematic symbols for hydraulic& Pneumatics system
 MEF507.2-Identify various components of hydraulic and pneumatic systems
 MEF507.3-Describe operation and applications of hydraulic & Pneumatics components and accessories
 MEF507.4- Operate valves and actuators used in hydraulics and pneumatics
 MEF507.5- Prepare circuit diagram for simple industrial problem

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX : [Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

				Pr	ogramme	e Outcon	nes POs	and PSOs	5			
Competency and Cos	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experi ments and practic e	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individua l and team work	PO 9 Commu nication	PO 10 Life- long learnin g	PSO1 Work in mfg& service sector	PSO 2 Start entrepr eneuria l ativity
Competency	-	3	3	3	-	-	-	-	-	-	3	2
MEF507.1	-	3	3	3	-	-	-	-	-	-	3	2
MEF507.2	-	3	3	3	-	-	-	-	-	-	3	2
MEF507.3	-	3	3	3	-	-	-	-	-	-	3	2
MEF507.4	-	3	3	3	-	-	-	-	-	-	3	2
MEF507.5	-	3	3	3	-	-	-	-	-	-	3	2

CONTENT: THEODY

A. TH	EORY: SECTION-I				
Sr. No.	Topics / Sub-topic	Teaching (Hours)	Theory Evaluation Marks		
С	ourse OutcomeMEF507-1 Recognize standard schematic symbols for hydraulic	& Pneumatic	rs system		
	MEF507.2- <i>Identify various components of hydraulic and pneumatic</i>	systems			
1.INTRODUCTION TO OIL HYDRAULIC SYSTEMS 1.1 Practical applications of hydraulic systems 1.2 General layout of oil hydraulic systems 1.3 Merits and limitations of oil hydraulic systems 1.4 Oils for hydraulic systems, their properties. 1.5 Selection of fluids, effect of temperature and pressure on hydraulic Fluid04					
Cour	accessories	unanes com	poneniis ana		
2.	PUMPS FOR HYDRAULIC SYSTEMS 2.1Pumps:Vane pump, gear pump, Gerotor pump, screw pump, piston pump (Types, construction, working principle, symbols) 2.2Selection of pump for power transmission, pump performance.	04	06		

Cou	rse Outcome MEF507-3Describe operation and applications of hydraulic& Pne	umatics comp	oonents and				
	accessories						
	MEF507.4- Operate valves and actuators used in hydraulics and pneumatics						
3.	COMPONENTS OF HYDRAULIC SYSTEM	12	20				
	A] VALVES						
	3.1 Pressure control valves: Pressure relief valve, Pressure reducing, Pressure						
	unload ,counter balance valve.						
	3.2 Direction control valves: Poppet valve, spool valve, 3/2, 4/2, 5/3 D.C.						
	valves with pilot, manually & solenoid						
	operated, Sequence valves.						
	3.3 Flow control valves: Pressure compensated, non pressure compensated						
	flow control valve.						
	(Types, construction, working principle and symbols of all components)						
	B] ACTUATORS						
	3.4 Actuator: Construction, working and symbols of						
	3.5 Rotary Actuators: Hydraulic motors						
	3.6 Linear Actuators: Cylinders- Single acting, Double acting						
	C] ACCESSORIES						
	3.7 Accessories: Pipes, Hoses, fittings, Oil filters, Seals and gaskets,						
	Accumulators.						
	(Types, construction, working principle and symbols of all components)						
Cours	e OutcomeMEF507-5Prepare circuit diagram for simple industrial problem						
4.		04	08				
	6 1 Mater in Mater out circuits						
	6.1 Meter III, Meter out circuits,						
	6.2 Seguencing circuit						
	6.3 Sequencing circuit,						
	6.4 Hydraulic circuits for Milling machine, Shaper machine						
	6.5 Motion synchronization circuit.						
	TOTAL	24	40				
Sen	nester end exam question paper should be such that total marks of questions on ea	ach topic is or	ne and half				
times	the marks allotted above but the candidates are able to attempt questions of the a	bove allotted	marks only.				

SECTION-II

Sr. No.	Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks		
Ca	ourse Outcome MEF507-1 Recognize standard schematic symbols for hydraulic&	Pneumatics	s system –		
	MEF507.2-Identify various components of hydraulic and pneumatic s	systems			
5	INTRODUCTION TO PNEUMATIC SYSTEMS	04	06		
	7.1 Applications of pneumatic system				
	7.2 General layout of pneumatic system				
	7.3 Merits and limitations of pneumatic systems				
Cou	Course Outcome MEF507-3Describe operation and applications of hydraulic& Pneumatics components and accessories				
6	COMPONENTS OF PNEUMATIC SYSTEM A] Compressor and Control valves	15	24		

Sr. No.	Topics/Sub-topic	Teaching (Hours)	Theory Evaluation Marks
	8.1 Reciprocating & Rotary compressors		
	8.2 Control Valves: Pressure regulating valves, Flow Control		
	Valves, Direction Control, Dual pressure valve,		
	Shuttle valve, Quick exhaust valve, Time delay valve.		
	B] ACTUATORS		
	Actuators,		
	8.3 Rotary: Air motors, construction, working principle		
	8.4 Linear: Cylinders- Types, construction & working principle		
	C] ACCESSORIES		
	8.5 Accessories: Pipes, Hoses, Fittings, FRL unit(Types,		
	construction, working principle and symbols of all		
	components)		
	Course OutcomeMEF507.5- Prepare circuit diagram for simple industr	ial problem	
7		05	10
	INDUSTRIAL PNEUMATIC CIRCUITS		
	11.1 Speed control circuits, Sequencing circuits, AND, OR circuits, Time &		
	travel dependent controls- Principle, Construction and practical applications,		
	TOTAL	24	40
Ser	nester end exam question paper should be such that total marks of questions on each	ch topic is or	ne and half
times	the marks allotted above but the candidates are able to attempt questions of the ab	ove allotted	marks only.

Specification table for setting question paper for semester end theory examination:

Торі	Name of topic	Distribu	tion of marks (level-wise)	Course	Total Mork	
No.		Remember	Understand	Applica- -tion	Outcome	S S
1	Introduction to oil hydraulic system.	2	2	2	MEF507-1 MEF507-2	6
2	Pumps for hydraulic system.	2	2	2	MEF507-3	6
3	Components of Hydraulic System	6	6	8	MEF507-3 MEF507-4	20
4	Hydraulic circuit	2	2	4	MEF507-5	8
5	Introduction to pneumatic system	2	2	2	MEF507-3	6
6	Components of pneumatic system.	8	8	8	MEF507-3	24
7	Pneumatic circuit	4	2	4	MEF507-5	10
	Total	26	24	30		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B. TERM WORK

Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work

Sr. No.	Laboratory experience	Skills developed	Course Outcome
1	ISO symbols for Hydraulic System	Identification of various Hydraulic	MEF507-1
	elements.	System elements.	
2	Study of various Hydraulic System	Use and working of Hydraulic System	MEF507-2,
	elements.	elements.	MEF507-3
3	Meter In and Meter Out circuit.	Make connections as per circuit	MEF507-4,
		diagram.	MEF507-5
4	Bleed Off Circuit.	Make connections as per circuit	MEF507-4,
		diagram.	MEF507-5
5	Sequencing Circuit.	Make connections as per circuit	MEF507-4,
		diagram.	MEF507-5
6	ISO symbols for Pneumatic System	Identification of various Pneumatic	MEF507-1
	elements.	System elements.	
7	Study of various Pneumatic System	Use and working of Pneumatic System	MEF507-3
	elements.	elements.	
8	Speed control circuits.	Make connections as per circuit	MEF507-4,
		diagram.	MEF507-5
9	Sequencing Circuit	Make connections as per circuit	MEF507-4,
		diagram.	MEF507-5
10	Care and Maintenance of Hydraulic	Servicing of various Hydraulic and	MEF507-3
	and Pneumatic System elements	Pneumatic System elements.	

C. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Industrial visit to study automation by means of	Industrial situations
	hydraulic and pneumatic system such as LPG	
	bottling plant, Hydraulic press, Injection moulding	
	machine	

ASSESSMENT CRITERIA FOR TERM WORK

b) Continuous Assessment of Practical :

Every Experiment of practical shall be assessed for 25 marks as per criteria given below:

Sr.	Criteria	Marks allotted
No.		
1	Attendance in regular practical	05
2	Correctness in diagram and experiment writing	05
3	Understanding of Experiment	10
4	Safety measures and Proper handling of devices	05
	Total	25

b) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given below:

Sr.	Criteria	Marks allotted
No.		
1	Correctness and understanding	10
2	Preparedness for practical	05
3	Proper Procedure and Workmanship	05
4	Safety measures and Proper handling of devices	05
	Total	25

INSTRUCTIONAL STRATEGIES :

Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations
- Audio presentations
 Computer
- 5. Question Bank

REFERENCE MATERIAL

a) Books

Sr. No.	Author	Title	Publisher
1.	S.R. Majumadar	Oil Hydraulic Systems	Tata McGraw Hill
2.	S.R. Majumadar	Pneumatic Systems	Tata McGraw Hill
3.	J.J. Pippenger	Industrial Hydraulics	Tata McGraw Hill
4.	Stewart	Hydraulics & Pneumatics	Taraporewala Publication

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Course ID

Course Name : TOOL ENGINEERING. Course code : MEF 508 Course Abbreviation : FTLG

TEACHING AND EVALUATION SCHEME:

Pre- requisite Courses (s) : NIL

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

EvaluationScheme:

	Progressiv	ve Assessment	Term				
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External))	Total	
Details of Evaluation	Average of two tests of 20 marks each	i.25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-I		
Marks	20		80		25	125	

Rationale:

This subject is classified as technology subject. It is intended to impart concepts, principles and procedures of tool engineering to the students so that they can understand the procedure of tool design to achieve highest productivity and perform duties as a technician in tool room, shop floor, quality control. The student can work as supervisor in plastic molding shop and as a sales engineer in tool industry.

COMPETENCY :Use various tools for different machining operationsCognitive : Understand various types of tools their geometry.Psychomotor : Design and forming of various tools and dies.Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality

COURSE OUTCOMES :

- 1) **MEE508.1**-Select cutting tools and its material using data book and manufacturer's catalogue.
- 2) **MEE508.2-**Estimate tool wear and tool life.
- 3) **MEE508.3-**Describe press tools and dies.
- 4) MEE508.4 Design strip layout for given component.
- 5) **MEE508.5**–Select cutting fluid for machining process

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
	PO 1 Basic	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO 2
	knowledge	Discipline	Experi	Engineeri	The	Environ	Ethics	Individual	Communi	Life-	Work in	Start
Competency		knowledge	ments	ng Tools	engineer	ment		and team	cation	long	mfg &	entrepre
and			and		and	and		work		learning	service	neurial
Cos			practice		society	sustaina					sector	ativity
						bility						
Competency		2									1	1
:	-	3	-	-	-	-	-	-	-	-	I	1
MEE508-1	-	3	-	-	-	_	-	-	-	-	1	1
MILLEUU I		5									-	-
MEE508-2	-	3	-	-	-	_	_	-	-	-	1	1
		Ű									-	-
MFF508-3	_	3	_	_	_	_	_	_	_	_	1	1
MEE500-5		5									1	1
MEE508 /		3									1	1
WIEE300-4	-	5	-	-	-	-	-	-	-	-	1	1
MEE508-5	-	3	-	-	-	-	-	-	-	-	1	1

CONTENT A. THEORY

SECTION - I

Sr. No. Cours catalo	Topics <i>e Outcome MEF508-1</i> Select cutting tools and its material using data boungue. <i>MEE508.5</i> –Select cutting fluid for machining process.	Teaching (Hours) ok and manu	Theory evaluation Marks facturer's
01.	 METAL CUTTING 1.1 Mechanics of Metal cutting: requirements of tools, cutting forces – 1.2 Types of chips, chip thickness ratio, shear angle (Simple Numericals) 1.3 Types of metal cutting process: Orthogonal, oblique and form cutting. 1.4 Cutting fluids: Types, characteristics and applications. 	10	16
02.	CUTTING TOOL GEOMETRY 4.1 Single point cutting tool, drills , reamers, milling cutters.	02	06
03.	TOOL MATERIALS3.1 Types, characteristics, applications.3.2 Heat treatment of tool steels,3.3 Specification of carbide tips, Types of ceramic coatings.	06	10

	Course Outcome MEE508.2- Estimate tool wear and tool life.				
04.	 TOOL WEAR 2.1 Tool wear, Types of wear, 2.2 Tool life, Tool life equations. 2.3 Machinability: definition, factors affecting machinability, machinability index. 	06	08		
	TOTAL	24	40		
Semes marks	ter end exam question paper should be such that total marks of questions on each to allotted above but the candidates are able to attempt questions of the above allotted m	pic is one and arks only.	half times the		

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
	Course Outcome MEE508.3- Describe press tools	and dies.	
5.	PRESS TOOLS 5.1 Presses: Introduction, Types, Specification.	02	04
6.	 TYPES OF DIES AND CONSTRUCTION 6.1 Simple Die, Compound Die, Progressive Die, Combination die. 6.2 Punch & die mountings, pilots, strippers, miss feed detectors, Pressure Pads, Knock outs, stock guide, Feed-Stop, guide bush, guide pins. 	04	08
7.	 DIE DESIGN FUNDAMENTALS 7.1Die Operations: blanking, piercing, shearing, cropping, notching, lancing, coining, embossing, stamping, curling, drawing, bending, forming. 7.2 Die set, Die shoe, Die area 7.3 Calculation of clearances on die and punch for blanking and piercing dies, Strip layout 7.4 Calculation of material utilization factor. 	06	10
8.	 FORMING DIES 8.1Bending: methods, Bending Dies, bend allowance, spring back, spanking, bending pressure, pressure pads, and development of blank length. 8.2 Drawing: operations, Metal flow during drawing. 8.3 Calculation of Drawing blank size, variables affecting metal flow during drawing, 8.4 Single action and double action dies, combination dies. 	08	12

SECTION – II

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9.	FUNDAMENTALS OF OTHER TOOLS 9.1 Constructional features of: Pressure Die casting dies, metal extrusion dies, injection moulding dies, forging dies, plastic extrusion dies.	04	06
	TOTAL	24	40
Semes	ter end exam question paper should be such that total marks of questions	on each top	ic is one and

half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination:

Section /		Distrib	Total		
Topic no.	Name of topic	Knowledge	Comprehension	Application	marks
1	Metal cutting	04	04	08	16
2	Tool wear	03	03	-	06
3	Tool material	03	03	04	10
4	Cutting tool geometry	02	02	04	08
5	Press tools	02	02	-	04
6	Types of dies and construction	02	03	03	08
7	Die design fundamentals	04	04	02	10
8	Forming dies	04	04	04	12
9	Fundamentals of other tools	02	02	02	06

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B. TERM WORK.

Practical Exercises and related skills developed.

Sr. No.	Laboratory experience	Skills developed	Course outcome
1.	Report on Visit to press shop for study of presses.	Understand working and construction of different press and can differentiate between types of press.	MEF508-3
2.	Sketches of Combination Die, Progressive Die, and Compound die, Inverted Die, Drawing Die, and Bending Die.	Understand different types of dies, their constructional features and working principal.	MEF508-1
3.	Drawing of strip layout of simple component (Different component for every student), and calculation of material utilization factor.	Understand and able to select suitable layout for a given work piece and calculation of material utilization factor.	MEF508-4
4.	Sketches of Injection Moulding die, Pressure die- casting die, forging die.	Understand working principal and construction of different types of injection molding dies.	MEF508-3
5.	Two assignments on calculation of Cutting forces and shear angle based on	Understand calculation of cutting forces and shear angle based on Merchant's angle. Understand tool angle of various cutting tools and there	MEF508-2

	Merchant's circle.	impotence.	
6.	One assignment each on development of blank length for bending operation and single stroke drawing operation.	Understand and able to calculate blank length and blank diameter of a given work piece. Design and draw drawing die for a given component.	MEF508-3
7.	One assignment on designation of carbide tools.	Understand designation of different carbide tools.	MEF508-1
8.	Sketches of different types of cutting tools showing details of tool angles.	Understand tool angles of various cutting tools and their importance.	MEF508-1
9.	One assignment on types of Punches and pilots, strippers	Able to select suitable punch, pilot and stripper for a given application	MEF508-3

C. INDUSTRIAL EXPOSURE :

Sr. No.	Mode of Exposure	Торіс
1	Industrial Visit	Press Tools
2	Industrial Visit	Die design fundamentals, Forming dies

ASSESSMENT CRITERIA FOR TERM WORK:

Sr. No	Criteria	Marks allotted
1	Attendance at regular practical	5
2	Preparedness for practical	5
3	Correct figures / diagrams	3
4	Observation tables	5
5	Result table / calculations / graphs	5
6	Safety / use of proper tools	2
		25

Instructional strategies:

- 1) Lectures and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.

Teaching and Learning resources, including references:

- 1) Chalk-board.
- 2) Demonstrative kits.

3) Demonstrative charts.

4) LCD Projector

REFERENCE MATERIAL:

a) Books :

Sr. No.	Author	Title	Publisher
01	Donaldson Anglin	Tool Design	Tata Mc Graw Hill
02	P. C. Sharma	A Text Book OF Production Engineering	S Chand & Co.
03	H. M. T.	Production Technology	Tata Mc Graw Hill
04	R. K. Jain	Production Technology	Khanna Publishers
05	A.S.T.M.E.	Fundamental of tool design.	Prentice-Hall of India.
06	M.H.A. Kempster	Introduction to Jig and Tool Design	Viva publ.
07	P. H. Joshi	Jigs and Fixtures	Tata Mc Graw Hill
08	P. H. Joshi	Press Tools	Tata Mc Graw Hill

b) Website:

- 1. <u>www.swikuo.com</u>
- www.workshopmachiery.com
 www.thomasnet.com
- 4. www.dmscncrouters.com/
- 5. www.enterprisemachinery.co.uk

Course ID

Course Name	: WELDING TECHNOLOGY.
Course Code	: MEF 509
Course Abbreviation	: FWLT

TEACHING AND EVALUATION SCHEME:

Pre- requisite Courses (s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	05

Evaluation Scheme:

	Progressiv	ve Assessment	Term End Examination				
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (External))	Total	
Details of Evaluation	Average of two tests of 20 marks each	i.25 marks for each practical ii.One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma- III	As per Proforma-I		
Marks	20		80		25	125	

Rationale:

As the standard of living continues to improve in most fabrication revolution using both common and more exotic processes, has been created. The exotic type of metal fabrication especially requires use of the most modern welding equipments and techniques.

COMPETENCY :Perform welding operations in Fabrication Work

Cognitive : Apply various types of welding Processes. **Psychomotor :** Use Welding processes for fabrication **Affective :** Attitude of i) precision ii) accuracy iii) safety iv) punctuality

COURSE OUTCOMES :

MEF509.1-Distinguish different welding processes.

MEF509.2-Select proper welding process for given job

MEF509.3-Demonstrate various types of welding processes

MEF509.4- Interpret welding drawing

MEF509.5–Follow safe practices in welding operations.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX:

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

		Programme Outcomes POs and PSOs										
	PO 1 Basic	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO 2
	knowledge	Discipline	Experi	Engineeri	The	Environ	Ethics	Individual	Communi	Life-	Work in	Start
Competency		knowledge	ments	ng Tools	engineer	ment		and team	cation	long	mfg &	entrepre
and			and		and	and		work		learning	service	neurial
Cos			practice		society	sustaina					sector	ativity
						bility	F			F	-	-
Competency	_	3	_	_	_	_	_	_	_	_	1	1
:		5									1	1
MEE500 1		2									1	1
WIEF 509-1	-	5	-	-	-	-	-	-	-	-	1	1
MEE500.2		2									1	1
MEF 509-2	-	5	-	-	-	-	-	-	-	-	1	1
MEE500.2		2									1	1
MEF509-5	-	5	-	-	-	-	-	-	-	-	1	1
MEE500 4		2									1	1
WIEF 509-4	-	3	-	-	-	-	-	-	-	-	1	1
MEE500 5		2									1	1
NIEF 509-5	-	3	-	-	-	-	-	-	-	-	1	1

CONTENT

A. THEORY

SECTION - I

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
Cour	se outcome :MEF509.1-Distinguish different welding proc	esses.	
	MEF509.2-Select proper welding process for	given job	
	MEF509.3- Demonstrate various types of well	ding processes	
	MEF509.4- Interpret welding drawing		
	MEF509.5–Follow safe practices in welding o	perations.	
1.	GAS SHIELD ARC WELDING	10	16
	2.1 Introduction		
	2.2 Equipments		
	2.3 TIG operation		
	2.4 MIG operation.		
	2.5 Applications.		
	Total	24	40
Semes	ster end exam question paper should be such that total marks of	questions on each	topic is one and
half ti	mes the marks allotted above but the candidates are able to atter	npt questions of th	e above allotted
marks	only.	~ ~	

SECTION -	Π
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Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
Cour	rse outcome :MEF509.1-Distinguish different welding proc MEF509.2-Select proper welding process for g MEF509.3- Demonstrate various types of weld MEF509.4- Interpret welding drawing MEF509.5-Follow safe practices in welding o	eesses. given job ding processes operations.	
2.	GAS WELDING. 3.1 Introduction 3.2 Equipments 3.3 Operation 3.4 Joining Processes. 3.5 Oxygen Fuel Cutting. 3.6 Application.	12	20
3.	 OTHER WELDING PROCESSES 4.1 Plasma Arc Welding. 4.2 Resistance Welding. 4.3 Electron Welding. 4.4 Laser Welding. 4.5 Thermit Welding. 4.6 Metal Flame Spraying. 4.7 Solid State Bonding. 4.8 Application Of Each Type. 	12	20
G	Total	24	40

half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Specification table for setting question paper for semester end theory examination:

Section /	Name of topic	Distribution of marks (level wise)			Total
Topic no.		Knowledge	Comprehension	Application	marks
1	Shield arc welding.	07	08	10	25
2	Gas shield arc welding.	04	05	06	15
3	Gas Welding.	06	06	08	20
4	Other Welding Processes.	06	06	08	20

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

B. TERM WORK.

Practical Exercises and related skills developed.

Sr. No.	Laboratory experience	Skills developed	Course outcome
1	Demonstration of Shield arc welding.		
2	Demonstration of Submerged Arc Welding.	The ability to know the process	MEF509.1
3	Demonstration of Carbon Arc Welding.	and equipment. The problems,	
4	Demonstration of Gas Shield arc welding.	limitations and applications of	MEF509.2
5	Demonstration of Gas welding.	the process.	
6	Demonstration of Gas Cutting.		MEF509.3
7	Study of other welding processes.		
8	Welding Symbols.	To know the welding drawings.	MEF509.4
	Study of Care and Safety in welding	Safety of the operator is	
	operation.	improved.	MEF509.5
10	Industrial visit to fabrication workshop for	To understand the practical	
	Arc welding and Gas welding Gas welding.	difficulties in the operation.	
11	Industrial visit for other welding processes.		

C. INDUSTRIAL EXPOSURE :

Sr. No.	Mode of Exposure	Торіс	
1	Industrial Visit	Gas Welding.	
2	Industrial Visit	Gas shield arc welding.	

ASSESSMENT CRITERIA FOR TERM WORK:

Sr. No	Criteria	Marks allotted
1	Attendance at regular practical	5
2	Preparedness for practical 5	
3	Correct figures / diagrams	3
4	Observation tables	5
5	Result table / calculations / graphs	5
6	Safety / use of proper tools 2	
	Total	25

INSTRUCTIONAL STRATEGIES Instructional methods

- 1) Lectures and discussions.
- 2) Laboratory experiences and laboratory interactive sessions.
- 3) Time bound assignments.
- 4) Industrial Visits

Teaching and Learning resources, including references:

- 1) Chalk-board.
- 2) Demonstrative kits.
- 3) Demonstrative charts.
- 4) LCD Projector

REFERENCE MATERIAL:

a) Books :

Sr. No.	Author	Name of the Book	Publication
1	Richard L. Little	Welding & Welding Technology	Tata McGraw-Hill.
2	Mohler Rudy	Practical Welding	Industrial Press Inc.

b) Website

i)www.swikuo.com

ii)www.workshopmachinery.com

iii)www.sodick.com/

iv)www.terprisemachinery.co.uk/