GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Curriculum Document

CURRICULUM : MPECS-2016

(Outcome Based Curriculum)

for

DIPLOMA IN INDUSTRIAL ELECTRONICS

Secretary **Chairman**

Programmewise Board of Studies (PBOS)
Industrial Electronics Programme
Government Polytechnic, Kolhapur

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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 feed back 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:

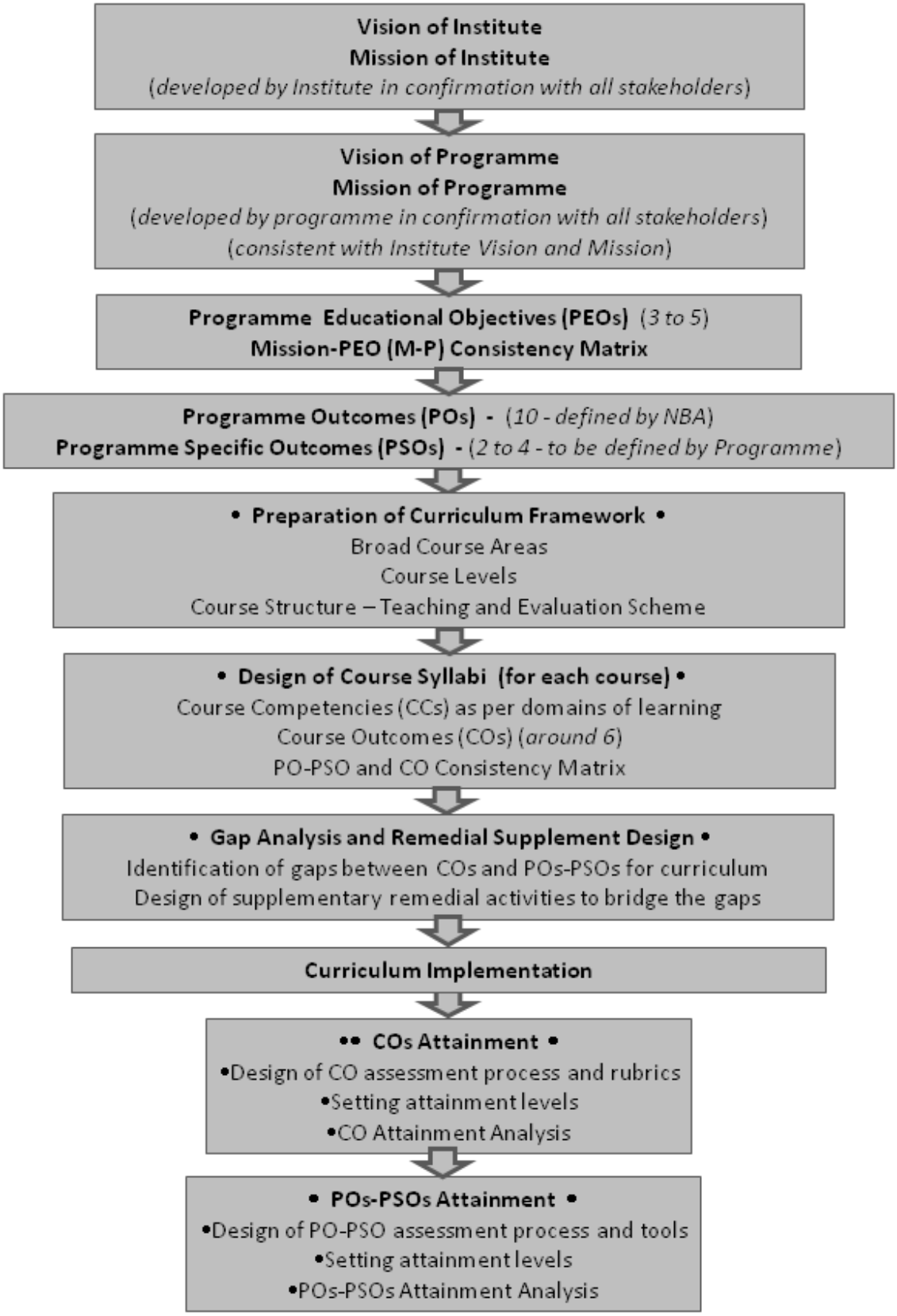
- To define the purpose of education
- To accept systematic planning methods
- To confirm implementation strategies
- To identify and to incorporate needs of industries
- To follow the policy directives
- To cope-up with social concerns
- To aim at personality development of students
- To allow future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

OUTCOME BASED EDUCATION SYSTEM



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 Accord and 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 13th June 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.

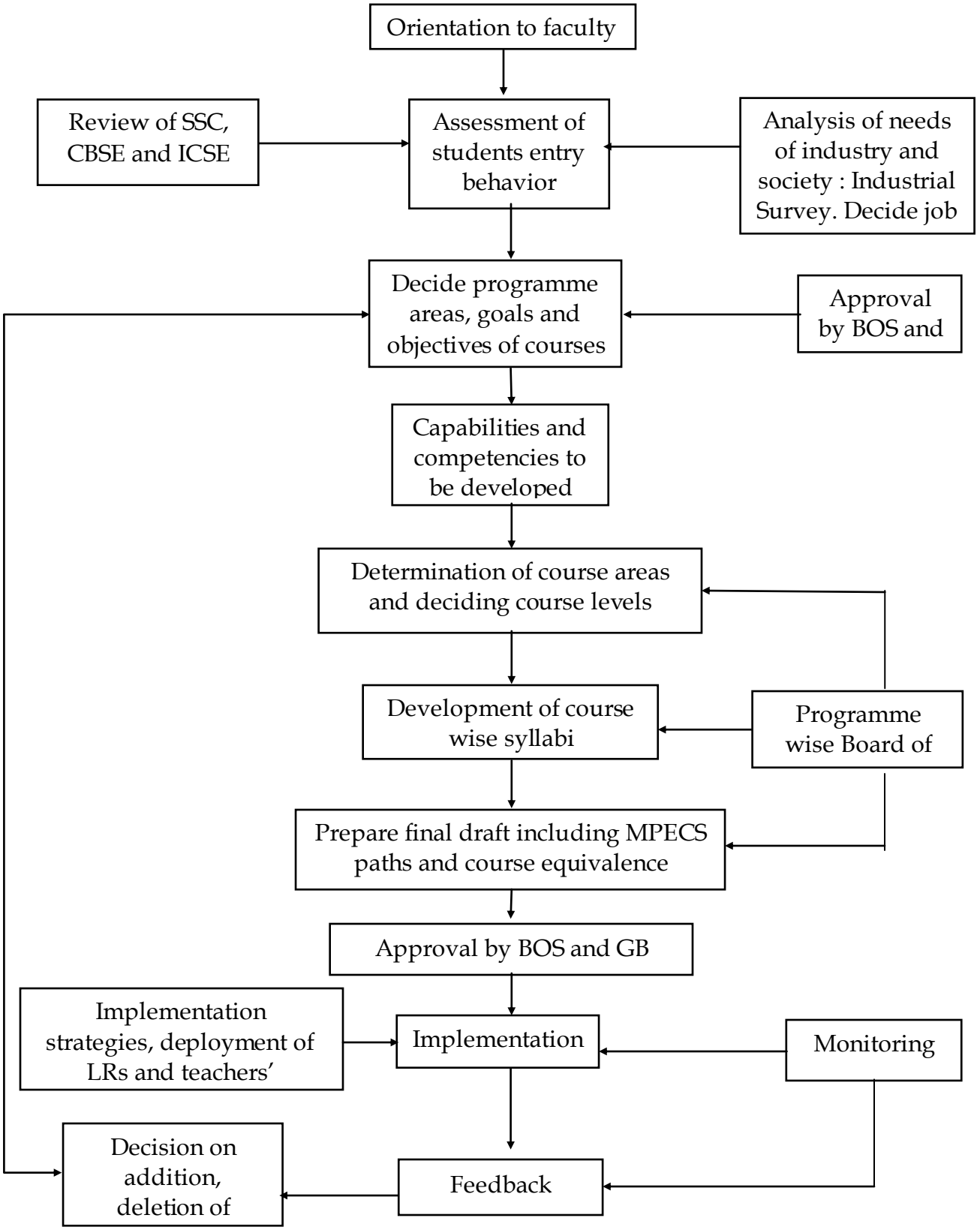
Programme Dean – He/she is the Head of Department of a Programme Department

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

Curriculum Development Model:



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

Vision of Institute:

The institute envisions to be one of the highly recognized institutes for developing competent technicians for quality professional services and entrepreneurship to cater the needs of industry and society.

Mission of Institute:

- To educate and train in multi-disciplinary multi-level programmes to develop competent technicians and skilled manpower for industrial needs
- To ensure employability, encourage entrepreneurship, promote lifelong learning
- To inculcate in 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 and high recognition

Vision of Programme:

Programme of high recognition and flexibility for development of competent technical manpower in the profession of industrial electronics.

Mission of Programme:

M1: To provide technical education of high recognition to the aspiring learners.

M2: To empower student's competency to fulfill nation's project of Digital India.

M3: To adapt student centric approach in teaching-learning process to mould students for skill oriented professional, social and ethical practices.

M4: To utilize flexibility in curriculum development to incorporate recent and emerging advancements in the field of industrial automation.

Programme Educational Objectives (PEOs):

Diploma graduates will,

PEO1. Apply fundamental knowledge of Basic Sciences, Mathematics and Industrial Electronics engineering in problem solving.

PEO2. Operate, demonstrate and debug the systems in the field of Industrial Electronics engineering and to resolve real life problems.

PEO3. Attain technical knowledge, skills and attitude to acquire further advancement in technology.

PEO 4. Work as a responsible team member of an organization to achieve its goal or can be an individual entrepreneur.

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 results 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 the 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 the context of technological changes.

Programme Specific Outcomes (PSOs)

PSO 1: Operate and Maintain: Competency to apply the concepts of Industrial Electronics in the operation and maintenance of engineering application systems.

PSO 2: Supervision and providing solution: Ability to supervise work and reach appropriate solution to simple practical problems in Industrial Electronics engineering industry.

Job profiand related Competencies for the diploma holder

After considerable discussion with the industry personnel and concerned Educationalists the Programme aims have been identified.

The Electronics & Telecommunication Engineering Programme aims to imbibe the following Social and Technical skills in the would be Electronic technician.

Social skills:-

01) Be a good citizen.
02) Communicate properly on technical matters at seminars and meetings.
03) Write letters conveying proper intent.
04) Prepare feasible technical reports on projects / market surveys.
05) Lead a small group of skilled workers for technical works.
06) Give creative suggestions on technical matters.
07) Devise and use innovative methods of learning new matters at the workplace.
08) Convince the subordinates about the importance of honesty and hard work.
09) Work along with the team he / she is in.
10) Help the newcomers and others in the industrial environment.

Technical skills:

01) Prepare drawings of various parts, circuit diagrams, symbols related to equipments as required by firms.
02) Work in the electronic communication industry as a supervisor.
03) Work as an assistant in the telecom workshop.
04) Operate and control various types of Electronics equipments & communication Instruments.
05) Determine / judge the performance of communication systems.
06) Carry out maintenance of the above equipments.
07) Test, install and commission the Electronic Equipments using electronic control.
08) Carryout Routine, Preventive, and Breakdown maintenance work with the help of Skilled workers.
09) Operate and control advanced electrical machines such as stepper motor, A.C.& D.C. servomotors.
10) Design electronic circuit / equipments.
11) Work as a Marketing personnel of supervisory level.
11) Work on Projects as an assistant to the manager.
12) Become an entrepreneur.

13) Work on readymade soft-wares on the computers.
14) Work as in-charge of stores keeping technical goods (electronic mainly).
15) Work as an assistant in Research and development department.
16) Carryout purchases related to project and general equipment and components.
17) Obtain / select proper consultant for project work.

Job Profile

Supervisor in

1) Electronics Goods Manufacturing Industry
2) Electronic Maintenance
3) Telecommunication Engineer
4) Marketing Executive
5) Design Assistant
6) Entrepreneur
7) Power sector
8) Hardware Manufacturing
9) Home Appliance and VLSI design, etc
10) Television Industry
11) Research & Development

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

3.1 Overview of Curriculum MPECS-2016

Total No. of Credits		180
No. of courses offered	Total	37
	Theory	28
Max. no. courses in a semester		07
Total Maximum Marks		4400
Courses in Level IV and V	No.	13
	Credits	65
	Marks	1600
Courses in Level I	No.	10
	Credits	48
	Marks	1125
Courses in Level II	No.	03
	Credits	11
	Marks	225
Courses in Level III	No.	11
	Credits	56
	Marks	1450
Courses in Level IV	No.	06
	Credits	33
	Marks	750
Courses in Level V	No.	07
	Credits	32
	Marks	850
%Ratio of Th:Pr	Marks-wise	62.5:37.5
	Credit-wise	58.88:41.12
No. of Allied Courses		--
Optional Courses	No. of courses	14
	Options/course	03
No. of Practical Exams	Internal	10
	External	09
No. of Orals	Internal	09
	External	03

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 as compared to previous MPECSs with justification:

After considerable discussion with the industry personnel and PBOS members we found it necessary to add and delete some courses as compared to previous MPECS

Following courses are newly added:-

1. Data communication system.
2. Automotive Electronics
3. Energy conservation

Courses Deleted:

1. Advanced communication system
2. Advanced Industrial Electronics.
3. Microprocessor and interfacing.
4. Environmental studies

Major modifications in Course Contents with justification:

1. A credit of Basic Electrical engineering Course has been reduced.
2. Contents of Physics and Chemistry are modified.
3. Contents of course ECA are modified.
4. Credits of Circuit & Network, Digital techniques & application, Power Electronics-I course are increased.
5. Contents of Basic electronics and Linear Integrated Circuits are modified.
6. Added Term work for Applied Electronics and Linear Integrated Circuits.
7. 8051 microcontroller shifted from level 4 to level 3.
8. Automotive Electronics course added to 6^{th} semester.
9. Energy conservation course added to 5^{th} semester

Changes in Implementation Strategy and Treatment:

1. As per suggestion of Director of MSBTE implant training of Four weeks after 4^{th} semester and two weeks after 2^{nd} semester is mandatory. Implant training is now a part of project term work.
2. In line with the policies of MSBTE there will be no backlog subjects for direct second year admitted students .Instead bridge course basic electronics is added without credits with a curriculum to be covered in 24 theory lectures.
3. To acquire NBA, outcome based curriculum (OBC) has been designed.

TEACHING AND EXAMINATION SCHEME (LEVEL-WISE)

SN	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme (marks)				
						Th	Pract. / Drg. / Tutorial	Credits	Th	TS	TW	Pr	Or
	Level 1: Foundation Courses												
1.	Electronic Components and Application	EIF 101	FECA	1	--	4	2	6	80	20	25I	-	25 I
2.	Engineering Physics	CCF 102	FPHB	1	--	4	2	6	80	20	-	50 I	-
3.	Basic Electronics	EIF 103	FBTX	1	--	4	2	6	80	20		50 I	-
4.	Chemistry of Engineering Materials	CCF 104	FCHB	1	--	4	2	6	80	20	-	50I	-
5.	Basic Mathematics	CCF 105	FBMT	1	--	3	1	4	80	20	-	-	-
6.	Engineering Mathematics	CCF 106	FEMT	1	CCF105	3	1	4	80	20	-	-	-
7.	Basic Electrical Engg	EIF 107	FBEE	1	--	3	2	5	80	20	-	-	25 I
8.	Computer Fundamentals And Applications	EIF 108	FCFA	1	--	1	2	3	-	-	25I	50 I	-
9.	Engineering Graphics	CCF 109	FEGR	1	--	2	4	6	-	-	25I	50E	
10	Workshop Practice	CCF 114	FWSD	1	--	-	2	2	-	-	50I	-	-
	Level 2 : Life Skills and Professional Skills Courses												
11	Generic Skills	CCF201	FGNS	2	--	2	2	4	--	--	25I	50I	--
12	Communication Skills	CCF202	FCMS	2	--	2	2	4	40	10	--	25I	--
13	Professional Practices	CCF203	FPRP	2	--	1	2	3	--	--	25I	--	50I
	Level 3: Basic Technology Courses												
14	Applied Mathematics	EIF301	FAMT	3	CCF106	3	1	4	80	20	--	--	--
15	Applied Electronics	EIF302	FATX	3	EIF 103	3	2	5	80	20	25	50E	--
16	Electronic Measuring Instruments	EIF303	FEMI	3	--	3	2	5	80	20	-	-	25 I
17	C Programming	EIF304	FCPR	3	--	2	2	4	-	-	25I	50E	-
18	Analog Communication	EIF305	FACM	3	--	3	2	5	80	20	-	50 I	-
19	Digital techniques & application	EIF306	FDTA	3	--	4	2	6	80	20	-	50 I	-
20	Linear Integrated Circuits	EIF307	FLIC	3	EIF103	4	2	6	80	20	25	50E	
21	Circuit & Network	EIF308	FCKN	3	--	4	2	6	80	20	-	-	25I
22	8051 Microcontroller	EIF309	FMCS	3	EIF306	4	2	6	80	20	-	50E	-
23	Electric Machines	IEF310	FEMC	3	EIF107	3	2	5	80	20	-	25I	-
24	Electives-1			3	--	3	1	4	80	20	-	-	-
	Level 4: Applied Technology Courses												
25	Power Electronics-I	EIF401	FPE1	4	--	4	2	6	80	20	-	50E	-
26	Embedded Systems	EIF402	FEMB	4	--	4	2	6	80	20	-	50E	-
27	Instrumentation	IEF403	FINS	4	--	4	2	6	80	20	-	-	25E
28	Principles Of Control System	EIF404	FPCS	4	--	4	2	6	80	20	-	-	25I
29	Simulation Software	EIF405	FSIM	4	--	-	4	4	-	-	25I	50I	-
30	Elective– 3			4	--	3	2	5	80	20	-	-	25I
	Level 5: Management and Diversified Technology Courses												
31	Power Electronics-II	IEF501	FPE2	5	EIF401	4	2	6	80	20	-	50 E	-
32	PLC	IEF 502	FPLC	5	--	4	2	6	80	20	-	-	25E
33	Project I	EIF503	FPR1	5	-	-	2	2	-	-	50I	-	25I
34	Project-II	EIF504	FPR2	5	EIF503	-	4	4	-	-	50I	-	75E
35	Elective– 2			5	--	3	2	5	80	20	-	-	25I
36	Elective– 4			5	--	3	-	3	80	20	-	-	-
37	Elective– 5			5	--	4	2	6	80	20	-	50E	-

Optional Courses for Electives

SN	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme (marks)				
						Th	Pract. / Drg. / Tutorial	Credits	Th	TS	TW	Pr	Or
	Elective – 1												
1.	Non-conventional energy sources	EIF311	FNCE	3	--	3	1	4	80	20	-	-	-
2.	Higher Mathematics	EIF312	FHMT	3	EIF301	3	1	4	80	20	-	-	-
	Elective – 2												
3.	Optoelectronics	IEF505	FOPT	5	--	3	2	5	80	20	-	-	25I
4.	Robotics	IEF506	FROB	5	--	3	2	5	80	20	-	-	25I
5.	Energy conservation	EIF507	FENC	5	--	3	2	5	80	20	-	-	25I
	Elective – 3												
6.	Electronics Circuit Design	EIF406	FECD	4	--	3	2	5	80	20	-	-	25I
7.	Digital System Design	IEF407	FDSD	4	--	3	2	5	80	20	-	-	25I
8.	Data Communication System	IEF408	FACS	4	--	3	2	5	80	20	-	-	25I
9.	Elective – 4												
	Industrial Organization Management	CCF501	FIOM	5	--	3	-	3	80	20	-	-	-
10.	Marketing Management	EIF509	FMRM	5	--	3	-	3	80	20	-	-	-
11.	Entrepreneurship Development	EIF510	FETD	5	--	3	-	3	80	20	-	-	-
	Elective – 5												
12.	Automotive Electronics	IEF 511	FAUT	5	--	4	2	6	80	20	-	50E	-
13.	PIC Microcontroller	EIF 512	FPIC	5	--	4	2	6	80	20	-	50 E	-
14.	VLSI	EIF 513	FVLS	5	--	4	2	6	80	20	-	50 E	-

PATH-WISE COURSE STRUCTURES
Path-1 : Students admitted to First Year - X std. pass outs

SN	Name of Course	Course Code	Course Abbrevi a-tion	Le ve l	Pre-requi-site Course	Teaching Scheme (hours per week)			Examination Scheme (Marks)				
						Th	Pract. / Drg. / Tutorial	Cr edi ts	Th	TS	TW	Pr	Or
	Semester 1												
1	Electronics Components & Application	EIF 101	FECA	1	--	4	2	6	80	20	25 I	--	25I
2	Engineering Physics	CCF 102	FPHB	1	--	4	2	6	80	20	-	50 I	-
3	Basic Mathematics	CCF 105	FBMT	1	--	3	1	4	80	20	-	-	-
4	Engineering Graphics	CCF 109	FEGR	1	--	2	4	6	-	-	25 I	50E	--
5	Generic Skills	CCF 201	FGNS	2	--	2	2	4	-	-	25I	50I	--
6	Workshop Practice	CCF 114	FWSD	1	--	0	2	2	-	-	50 I	-	-
	Semester 2												
7	Basic Electronics	EIF 103	FBTX	1	--	4	2	6	80	20		50 I	-
8	Chemistry of Engineering Materials	CCF 104	FCHB	1	--	4	2	6	80	20	-	50 I	-
9	Engineering Mathematics	CCF 106	FEMT	1	CCF105	3	1	4	80	20	-	-	-
10	Basic Electrical Engg	EIF 107	FBEE	1	--	3	2	5	80	20	-	-	25 I
11	Computer Fundamentals And Applications	EIF 108	FCFA	1	--	1	2	3	-	-	25 I	50 I	-
12	Communication Skills	CCF202	FCMS	2	--	2	2	4	40	10	--	25 I	--
	Semester 3												
13	Applied Mathematics	EIF301	FAMT	3	CCF106	3	1	4	80	20	--	--	--
14	Applied Electronics	EIF302	FATX	3	EIF 103	3	2	5	80	20	25	50E	--
15	Electronic Measuring Instruments	EIF303	FEMI	3	--	3	2	5	80	20	-	-	25 I
16	C Programming	EIF304	FCPR	3	--	2	2	4	-	-	25 I	50E	-
17	Analog Communication	EIF305	FACM	3	--	3	2	5	80	20	-	50 I	-
18	Digital techniques & application	EIF306	FDTA	3	--	4	2	6	80	20	-	50 I	-
19	Professional Practices	CCF203	FPRP	2	--	1	2	3			25 I	-	50I
	Semester 4												
20	Linear Integrated Circuits	EIF307	FLIC	3	EIF103	4	2	6	80	20	25	50E	
21	Circuit & Network	EIF308	FCKN	3	--	4	2	6	80	20	-	-	25I
22	8051 Microcontroller	EIF309	FMCS	3	EIF306	4	2	6	80	20	-	50E	-
23	Electric Machines	IEF310	FEMC	3	EIF107	3	2	5	80	20	-	25I	-
24	Simulation Software	EIF405	FSIM	4	--	-	4	4	-	-	25I	50I	-
25	Electives-1			3	--	3	1	4	80	20	-	-	-
	Semester 5												
26	Power Electronics-I	EIF401	FPE1	4	--	4	2	6	80	20	-	50E	-
27	Embedded Systems	EIF402	FEMB	4	--	4	2	6	80	20	-	50E	-
28	Instrumentation	IEF403	FINS	4	--	4	2	6	80	20	-	-	25E
29	Project I	EIF503	FPR1	5	--	-	2	2	-	-	50I	-	25I
30	Elective– 2			5	--	3	2	5	80	20	-	-	25I
31	Elective– 3			4	--	3	2	5	80	20	-	-	25I
	Semester 6												
32	Principles Of Control System	EIF 404	FPCS	4	--	4	2	6	80	20	-	-	25I
33	Power Electronics-II	IEF501	FPE2	5	EIF401	4	2	6	80	20	-	50E	-
34	PLC	IEF 502	FPLC	5	--	4	2	6	80	20	-	-	25E
35	Project-II	EIF 504	FPR2	5	EIF503	-	4	4	-	-	50I	-	75E
36	Elective– 4			5	--	3	-	3	80	20	-	-	-
37	Elective– 5			5	--	4	2	6	80	20	-	50E	-

Path-wise Course Structure
Path-2 :Students admitted directly to Second Year

SN	Name of Course	Course Code	Course Abbrevia-tion	Level	Pre-requi-site Course	Teaching Scheme (hours per week)			Examination Scheme (Marks)				
						Th	Pract. / Drg. / Tutorial	Credits	Th	TS	TW	Pr	Or
	Semester 3												
1	Applied Mathematics	EIF301	FAMT	3	CCF106	3	1	4	80	20	--	--	--
2	Applied Electronics	EIF302	FATX	3	EIF103	3	2	5	80	20	25	50E	--
3	Electronic Measuring Instruments	EIF303	FEMI	3	--	3	2	5	80	20	-	-	25 I
4	C Programming	EIF304	FCPR	3	--	2	2	4	-	-	25 I	50E	-
5	Analog Communication	EIF305	FACM	3	--	3	2	5	80	20	-	50 I	-
6	Digital techniques & application	EIF306	FDTA	3	--	4	2	6	80	20	-	50 I	-
7	Professional Practices	CCF203	FPRP	2	--	1	2	3			25 I	-	50I
	Semester 4												
8	Linear Integrated Circuits	EIF307	FLIC	3	EIF103	4	2	6	80	20	25	50E	
9	Circuit & Network	EIF308	FCKN	3		4	2	6	80	20	-	-	25I
10	8051 Microcontroller	EIF309	FMCS	3	EIF306	4	2	6	80	20	-	50E	-
11	Electric Machines	IEF310	FEMC	3	EIF107	3	2	5	80	20	-	25I	-
12	Simulation Software	EIF405	FSIM	4	--	-	4	4	-	-	25I	50I	-
13	Electives-1			3	--	3	1	4	80	20	-	-	-
	Semester 5												
14	Power Electronics-I	EIF401	FPE1	4	--	4	2	6	80	20	-	50E	-
15	Embedded Systems	EIF402	FEMB	4	--	4	2	6	80	20	-	50E	-
16	Instrumentation	IEF403	FINS	4	--	4	2	6	80	20	-	-	25E
17	Project I	EIF503	FPR1	5	--	-	2	2	-	-	50I	-	25I
18	Elective– 2			5	--	3	2	5	80	20	-	-	25I
19	Elective– 3			4	--	3	2	5	80	20	-	-	25I
	Semester 6												
20	Principles Of Control System	EIF 404	FPCS	4	--	4	2	6	80	20	-	-	25I
21	Power Electronics-II	IEF501	FPE2	5	EIF401	4	2	6	80	20	-	50E	-
22	PLC	IEF 502	FPLC	5	--	4	2	6	80	20	-	-	25E
23	Project-II	EIF 504	FPR2	5	EIF503	-	4	4	-	-	50I	-	75E
24	Elective– 4			5	--	3	-	3	80	20	-	-	-
25	Elective– 5			5	--	4	2	6	80	20	-	50E	-

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

SN	Name of Course	Course Code	Whether eligible for exemption ? (Yes / No)				
			XII Science	XII Tech.	XII MCVC	XII Voc.	ITI
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	CCF 105	**YES**	**YES**	No	**YES**	No
6	Engineering Mathematics	CCF 106	**YES**	**YES**	No	**YES**	No
7	Engineering Drawing-1 (CE/ME/MT)	CCF 107	No	**YES**	No	No	No
8	Engineering Drawing-1(SM)	CCF 117	No	**YES**	No	No	No
9	Engineering Drawing-2 (CE/ME/SM/MT)	CCF 108	No	**YES**	No	No	No
10	Engineering Graphics (EE/IT/ IE/ET)	CCF 109	No	**YES**	No	No	No
11	Applied Mechanics	CCF 110	No	No	No	No	No
12	Workshop Practices–1 (CE)	CCF 111	No	**YES**	**YES**	**YES**	**YES**
13	Workshop Practices–1 (ME, SM,MT)	CCF 112	No	**YES**	**YES**	**YES**	**YES**
14	Workshop Practices (EE)	CCF 113	No	**YES**	**YES**	**YES**	**YES**
15	Workshop Practices (IE, ET)	CCF114	No	**YES**	**YES**	**YES**	**YES**
16	Workshop Practices -2 (CE)	CCF 115	No	**YES**	**YES**	**YES**	**YES**
17	Workshop Practices -2 (ME, SM,MT)	CCF 116	No	**YES**	**YES**	**YES**	**YES**
18	Generic Skills	CCF 201	No	No	No	No	No
19	Communication Skills	CCF 202	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.

9.COURSE EQUIVALENCE FOR PREVIOUS MPECSs

SN	MPECS-2001	MPECS-2006	MPECS-2010	MPECS-2013	MPECS-2016
1.	**101**-Generic Skill	**R101**-Generic Skill	**X101**-Generic Skill	**CCE201**-Gen. Skills	**CCF201**-Gen. Skills
2.	**103**-Applied Physics-I	**R103**-Applied Physics-I	**X102**-Basic Physics	**CCE102**-Engineering Physics	**CCF102**-Engineering Physics
3.	**105**-Applied Chemistry-I	**R105**-Applied Chemistry	**X103**--Applied Chemistry	**CCE104**-Engineering Chemistry	**CCF104**-Chemistry of Engineering Materials
4.	**107**-Applied Mathematics-I	**R107**-Basic Mathematics	**X104**-Basic Mathematics	**CCE105**-Basic Mathematics	**CCF105**-Basic Mathematics
5.	**109**-Engineering Drawing-I	**R109**-Engineering Drawing-I	**IX/EJ 105**-EngineeringDrawing	----	-----
6.	**102**-Comm.Skills	**R102**-Comm.Skills	**X106**-Comm.Skills	**CCE202**-Com.Skills	**CCF202**-Com.Skills
7.	**113**-Workshop Practice-I	**R113**-Workshop Practice-I	**IX/EJ107**Basic Workshop Practice	**CCE114**-Workshop Practice	**CCF114**-Workshop Practice
8.	**114**-Workshop Practice-II	**R114**-Workshop Practice-II	**IX/EJ107**-Basic Workshop Practice	**CCE114**-Workshop Practice	**CCF114**-Workshop Practice
9.	**104**-Applied Physics-II	**R104**-Applied Physics- II	**X108**Engineering Sciences	----	----
10.	**106**- Applied Chemistry-I	**R106**-Chemistry Of Engg.Materials	**X108**Engineering Sciences	----	----
11.	**4206**-Electronic Workshop	**IE206**-Electronic Workshop	**IX/EJ109**-Electronics Components &Application (Only Practical's)	**IEE/ETE101**-Electronics Components &Application (Only Practical's)	**EIF 101**-Electronics Components &Application (Only Practical's)
12.	**108**-Applied Mathematics-II	**R108**-Engg. Mathematics	**X110**-Engineering Mathematics	**CCE106**-Engineering Mathematics	**CCF 106**-Engineering Mathematics
13.	**110**-Engineering Drawing-II	**R110**-Engineering Drawing-II	----	----	----------
14.				**CCE 109**-Engineering Graphics	**CCF 109**-Engineering Graphics

15	**111**-Fundamental Of Engg-I	----	----	----	----------
16	**112**-Fundamental Of Engg-II	----	----	----	----------
17	**115**-Intro to Comp	**R111**-Computer Fundamental & Application	----	**IEE/ETE108**-Computer Fundamental & Application	**EIF 108**-Computer Fundamental & Application
18	**4202**-Electronic Devices & Circuits	**IE202**-Electronic Devices & Circuits	**IX/EJ111**-Basic Electronics	**IEE/ETE103**-Basic Electronics	**EIF 103**-Basic Electronics
19			**IX/EJ112**- Circuit & Network	**IEE/ETE308**-Circuit & Network	**EIF 308**- Circuit & Network
20	**116**-Applied Mechanics	**R112**-Applied Mechanics	---	---	------
21	**4201**-Mathematics III	**IE201**- Applied Mathematics	**ET201**- Applied Mathematics	**IEE/ETE301**-Applied Mathematics	**EIF 301**- Applied Mathematics
22	----	**IE203**-Personality Development	----	----	----------
23				**CCE203**-Professional Practices	**CCF203**-Professional Practices
24	----	**IE205**- Electrical Engineering	----	----	----------
25	**4301**-Applied Electronics	**IE301**-Applied Electronics	**IX/EJ202**-Applied Electronics	**IEE/ETE302**-Applied Electronics	**EIF 302**-Applied Electronics
26	**4204**- Electronics Measuring Instruments	**IE204**-Electronics Measuring Instruments	**IX/EJ203**-Electronics Measuring Instruments	**IEE/ETE303**-Electronics Measuring Instruments	**EIF 303**-Electronics Measuring Instruments
27	**4401**-C Programming	**IE 401**-C Programming	**IX /EJ204**- C Programming	**IEE/ETE304**-C Programming	**EIF 304**-C Programming
28	**4209**-Principles of Communication system	**IE209**-Principles of Communication system	**IX/EJ205**-Analog Communication	**IEE/ETE305**-Analog Communication	**EIF 305**-Analog Communication
29	**4207**- Linear Integrated Circuits	**IE207**- Linear Integrated Circuits	**IX/EJ206**- Linear Integrated Circuits	**IEE/ETE307**-Linear Integrated Circuits	**EIF 307**- Linear Integrated Circuits
30	**4208**- Digital Techniques	**IE208**- Digital Techniques	**IX/EJ207**- Digital Techniques	**IEE/ETE306**-Digital Techniques &Application	**EIF 306**-Digital Techniques &Application

31				**IEE310-** Electric Machines	**EIF 310-** Electric Machines
32	4211- Developmemnt of soft skills	**IE211-** Project & Seminar-I	----	**IEE/ETE503-** Project-1	**EIF 503-** Project-1
33	**0222-** Electrical CKTS. & M\Cs	**R222-** Electrical CKTS. & M\Cs	----	----	------
34	**0223-** Basic Electronics	**R223-** Basic Electronics	----	----	----
35	**0227-** Non Conventional Energy Sources	**R227-** Non Conventional Energy Sources	----	**IEE/ETE311-** Non Conventional Energy Sources	**EIF 311-** Non Conventional Energy Sources
36	**0228-** Higher Maths	**R228-** Higher Maths	**IX/EJ210**-Higher Engineering Maths	**IEE/ETE312-** Higher Mathematics	**EIF 312-** Higher Mathematics
37	**4302-** Industrial Electronics	**IE302-** Industrial Electronics	**IX/EJ211-** Industrial Electronics	**IEE/ETE401-** Power Electronics-1	**EIF 401**-Power Electronics-1
38	**4304-** Power Electronics	**IE 304-** Power Electronics	**IX 301-** Power Electronics	**IEE 511-** Power Electronics-2	**EIF 511-** Power Electronics-2
39	**4409-** Microcontrollers and their applications	**IE 303**-8051 Microcontroller	**EJ302**-8051 Microcontroller	**IEE/ETE402**-8051 Microcontroller	**EIF 309**-8051 Microcontroller
40	**4210-** Principles Of control System	**IE210-** Principles Of control System	**IX/EJ303-** Feedback control System	**IEE/ETE404-** Principles Of control System	**EIF 404-** Principles Of control System
41	**4307-** Instrumentation	**IE 306-** Instrumentation	**IX/EJ304-** Instrumentation	**IEE403-** Instrumentation	**EIF 403-** Instrumentation
42	----	----	**IX/EJ305-** Optoelectronics	**IEE305-** Optoelectronics	**EIF 305-** Optoelectronics
43	**4309-** Medical Electronics	**IE 309-** Medical Electronics	**IX/EJ306-** Medical Electronics	----	---
44		**IE 312-** Industrial Drives	**IX307-** Industrial Drives	----	---
45	**4306-** Electronics Circuit Design	**IE 311-** Electronics Circuit Design	**EJ308**-Electronics Circuit Design	**IEE/ETE406** Electronics Circuit Design	**EIF 406-** Electronics Circuit Design
46	----	**IE 402-** PC Hardware & Maintenance	**IX309**-Computer H/W & Maintenance (Only Practicals)	----	---
47	**4308-** I.C.Applications	**IE 308-** I.C.Applications	----	----	----
48	**4310-** Microelectronics	**IE 310-** Microelectronics	----	----	---

49	**4407-** Industrial Process Control	**IE 407-** Industrial Process Control	IX401-Industrial Automation	----	---
50	----	**IE 403-** Introduction To Matlab & ORCAD	**EJ402-** Introduction To Matlab & ORCAD	**IEE/ETE405-** Simulation Software	**EIF 405-** Simulation Software
51	**4305-** Project & Seminar-II	**IE305-** Project & Seminar-II	**EJ403-**Project	**IEE/ETE504-** Project 2	**EIF 504**-Project 2
52	**4404-** Industrial Organization & Management	**IE 404-** Industrial Organization & Management	**EJ404-** Industrial Organization & Management	**IEE/ETE508-** Industrial Organization & Management	**CCF 501-** Industrial Organization & Management
53	**4405-** Marketing Management	**IE 405-** Marketing Management	**EJ405-** Marketing Management	**IEE/ETE509-** Marketing Management	**EIF406-** Marketing Management
54	**4406-** Project Management	**IE 406-** Project Management	-----	----	---
55	**4403-** Entrepreneurship	**IE 307-** Entrepreneurship Development	**EJ406-** Entrepreneurship Development	**IEE/ETE510-** Entrepreneurship Development	**EIF 510-** Entrepreneurship Development
56	**4408-**Advanced microprocessor & OS	----	----	----	---
57	**4303-** **M**icroprocessor	**IE 408-** Microprocessor-I	**IX/EJ209-** Microprocessor & Interfacing	**IEE/ETE309-** Microprocessor & Interfacing	**---**
58	**4303-** **M**icroprocessor	**IE 409-** Microprocessor-II	**IX/EJ209-** Microprocessor & Interfacing	**IEE/ETE309-** Microprocessor & Interfacing	**----**
59	**4410-**Television Engineering	**IE 410-** Television Engineering	----	----	---
60	**4411-**Relational Database Management Systems	**IE 411-** Relational Database Management Systems	----	----	----
61	----	----	**IX/EJ407** -VLSI Design	**IEE/ETE407-** VLSI	**EIF 513-**VLSI
62	----	----	**IX/EJ 408-** Embedded systems	**IEE502-**Embedded systems	**EIF 402-** Embedded systems
63	----	----	**IX/EJ 409-** Datacommunicati on & networking	----	---
64	----	----	**IX410-** Process Instrumentation	----	---

65	**4412-**Electronic System Design	**IE 412-** Electronic System Design	**IX411-**Digital System Design	**IEE-407-**Digital System Design	**IEF 407**- Digital System Design
66	----	----	**IX412-**Advanced Industrial Electronics	**IEE506-**Advanced Industrial Electronics	----
67	**4413-**Electronic Laboratory Equipment Maintenance	**IE 413-** Electronic Laboratory Equipment Maintenance	**IX 413-**Electronic Laboratory Equipment Maintenance	----	---
68	**4414-**Radio and TV servicing	**IE 414-**Radio and TV servicing	----	----	---
69	----	----	**IX/EJ 414-** Computer Networking	----	---
70	**4402-**Computer Applications	**IE 415**- Visual Basic & MS ACCESS	**EJ415-**Visual Basics & MS ACCESS	----	----
71			---	**IEE511-**PLC & Drives	IEF502 - PLC
72				**IEE 507**- Robotics	IEF506 - Robotics
73				**IEE 408-**Advanced Communication System	**IEF408 -Data** Communication System
74				**IEE/ETE512-**PIC Microcontroller	**EIF 512-**PIC Microcontroller
75				**IEE/ETE107-** Basic Electrical Engg.	**EIF 107**- Basic Electrical Engg.
76				**CCE204-** Environmental Studies	---

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 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 Examiner	Performance Of Term End OR/PR By External Examiner	Marks Out of	Marks As per Evaluation Scheme
	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 Examiner	Marks out of	Marks As per Evaluation Scheme
	25	25	50	100	

Name and Signature of Internal Examiner

PROFORMA III
GOVERNMENT POLYTECHNIC,KOLHAPUR
Performance for Final Assessment of TERMWORK

By Internal Examiner

(For subjects having ONLY TERMWORK)

Course Code & Course Name--_____

Programme -_____

Summer/Winter Exam-_____Date-_____

Roll No /Exam No	Marks of Progressive Skill Test	Marks of Continuous Assessment	Marks out of	Marks As per Evaluation Scheme
	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/WinterExam-_____Date-_____

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

Name and signature of Internal Examiner

PROFORMA–VI

GOVERNMENT POLYTECHNIC, 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-_____

Roll No/ Exam No	Marks of Continuous Assessment	Marks out of	Marks as per Evaluation Scheme
	100	100	

Name and Signature of Internal Examiner

LEVEL- I
FOUNDATION COURSES

Course ID:

Course Name : ELECTRONIC COMPONENTS AND APPLICATIONS
Course : EIF 101
Course Abbreviation: FECA

TEACHING AND EVALUATION SCHEME :

Prerequisites : NIL
Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	4	6
Practical	2	

Evaluation Scheme :

Mode of Evaluation	**Progressive Assessment**		Theory Examination	**Term End Examination**		**Total**
	Theory	Practical		Term Work	*oral	
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 Pro-forma VI	Internal Oral Exam	
Marks	**20**	**---**	**80**	**25**	**25 I**	**150**

I-Internal Examination * Assessment as per Pro-forma V

Term Work Assessment as per Pro-forma VI.

RATIONALE:

Material science plays vital role in Technology. Due to rapid up gradation and modification in the use of electronic components, every engineer should have the knowledge of components. This subject gives clear idea of all fundamentals of electronic components and their practical applications. This subject includes method of fabrication, working, testing, characteristics, specifications, assembling, designing. And fault finding. In industrial applications, students will be able to understand and visualize other electronic circuits and devices.

COMPETENCY:

Understanding and visualizing electronic circuits and devices.
Cognitive: List passive components; types of cables, connectors, switches, relays displays and design of PCB.
Psychomotor: Calculate values of resistors, capacitors, inductors and making of PCB.
Affective: Attitude of i) Logic ii) Accuracy iii) Precision iv) Punctuality

COURSE OUTCOMES:

EIF101-1 Illustrate the use of components based on the functions and the specifications in the problem solving.
EIF101-2 Explain electronics components with respective to its classifications, functions, specifications and applications.
EIF101-3 Identify and test electronic components in the given circuit.
EIF101-4 Develop PCB layout for the given circuit..

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Understanding and visualizing electronic circuits and devices	2	-	2	-	-	-	-	-	-	-	3	2
EIF101-1	2	-	1	-	-	-	-	-	-	-	-	-
EIF101-2	2	-	1	-	-	-	-	-	-	-	-	-
EIF101-3	2	-	1	-	-	-	-	-	-	-	-	-
EIF101-4	1	-	3	2	-	-	-	1	-	1	3	2

CONTENT :

A) THEORY : Section I

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
EIF101-1 *Illustrate the use of components based on the functions and the specifications in the problem solving.* ***EIF101-2*** *Explain electronics components with respective to its classifications, functions, specifications and applications.* ***EIF101-3*** *Identify and test electronic components in the given circuit.*			
01	**Resistors:** 1.1 Components-discrete, non-discrete, Active, passive components. 1.2 Concept of Resistors, types of resistors, Materials used for resistors, Definition of Linear and nonlinear resistors 1.3 Resistors general specification: - maximum voltage rating, power rating, temperature coefficient, tolerance, Ohmic range, voltage coefficient, operating temperature 1.4 Construction, specification, application of Carbon film resistors, Colour Coding with three, four and five bands, Equivalent circuit of resistors 1.5 Standard Wire wound resistors construction, working, specification, application, characteristic curves of TDR, LDR 1.6 Concept of linear & logarithmic potentiometer, Comparison between Linear and Logarithmic Potentiometer, rheostat, cermet trimmer.	12	14
02	**Capacitors:** 2.1 Classification of capacitors, Materials used for capacitors, Type of dielectrics 2.2 capacitors specification :- capacitor working voltage, Insulation resistance, c/v ratio, power factor 2.3 Fixed Capacitor- construction, specification ,application of Disc Ceramic capacitor, 2.4 Aluminum electrolytic capacitor, Tantalum electrolytic capacitor **2.5** Variable capacitor, Requirements of variable condenser Construction, working, specification, applications of Air Gang, PVC gang capacitor, Trimmer capacitor – concentric cylinder type. Color coding of capacitors, Equivalent circuit of capacitors	12	14

03	**Inductors:** 3.1 Inductor Specifications :- self inductance ,mutual inductance, coefficient of coupling ,leakage inductance, operation at low & high frequency, Q factor, Inductive Reactance. 3.2 Construction, application of Air core, iron core, ferrite core, frequency range Inductors(A.F.,R.F.,I.F.),filter choke, toroidal Inductor 3.3 Construction, working specification, application of Slug tuned Inductor, Tapped Inductor. **3.4** colors coding of Inductor using color band system. Equivalent circuit of Inductor.	8	12
	TOTAL	**32**	**40**

Section-II

Chapter	**Topic** **Subtopics**	**Teaching Hours**	**Theory Evaluation Marks**
EIF101-1 *Illustrate the use of components based on the functions and the specifications in the problem solving.* ***EIF101-2*** *Explain electronics components with respective to its classifications, functions, specifications and applications.* ***EIF101-3*** *Identify and test electronic components in the given circuit.*			
04	**Cables:** 4.1 General specifications of cables- characteristic impedance, current carrying capacity, flexibility. 4.2 Types of cables- construction, specifications and applications of coaxial cable, telephone cable, FRC cable, Twin core cable(Twisted & Shielded type)cable used for CRO, optical Fiber Cable. **Connectors:** 4.3 general specifications of connectors- contact resistance, breakdown voltage, insulation resistance 4.4 Type of connectors – construction, specifications and applications of BNC, TNC, RF, D series, Audio, Video, printer, edge, FRC connectors, Phone Plug & Jacks	10	14

05	**Switches, Relays and Displays** **Switches:** 5.1 Switch Specifications - voltage rating, contact current rating, contact resistance, life. 5.2 Characteristics of switch , electrical life, mechanical life 5.3 construction , specification ,application of Toggle, Rotary, push to on & push to off, Rocker switch, slide switch, MCB,LCB switches **Relays** 5.4 Define NO,NC contact, Characteristics of relay 5.5 construction, working, specification, application of General purpose relay ,Dry reed ,Mercury wetted Reed relay 5.6 Difference between switch & relay, Displays, contactors. **Displays:** 5.7 Types of displays 5.8 LED construction, operation & application of Bicolor LED, Seven segment display-common cathode & common anode display, Dot matrix array, sixteen, fourteen segment display 5.9 Liquid crystal display- construction, operation & applications of LCD	14	16
	***EIF101-** 4 Develop PCB layout for the given circuit.*		
6	**Printed Circuit Board** 6.1 Introduction to PCB ,Advantages & disadvantages of PCB, Types of PCB 6.2 Base & Conducting material, types of laminates, Flowchart for preparation of PCB. 6.3 Screen printing ,photo printing method 6.4 Drilling, Mounting of components 6.5 Soldering technique: Methods of soldering, Dip, wave, Hand, Necessary conditions for soldering 6.6 Final protection, Safety, health & Medical aspects of soldering 6.7 Introduction to SMD	08	10
	TOTAL	**32**	**40**

Specification Table For Question Paper of Theory Examination:

Section / Topic no.	Name Of the Topic	Distribution Of Marks (Level Wise)				Total Marks
		Remember	Understand	Application	Course outcomes	
I/1	Resistors	8	4	2	EIF101-1,2,3	14
I/2	Capacitors	8	4	2	EIF101-1,2,3	14
I/3	Inductors	8	2	2	EIF101-1,2,3	12
I/4	Cables	8	4	2	EIF101-1,2,3	14
II/5	Switches, relays and displays	8	4	4	EIF101-1,2,3	16
II/6	Printed Circuit Board	6	2	2	EIF101-4	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: (Minimum Eight practical's from List)

Laboratory experiments and related skills to be developed :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Resistance and its types	• Testing & identification of different types of resistors. • Find out tolerance & wattage of resistors depending on size. • Measure the value of resistor using multimeter	EIF101-1,2,3
2.	Potentiometer	• Test variation of resistance in linear, logarithmic potentiometer. • Draw Graph of potentiometer.	EIF101-1,2,3
3.	TDR ,LDR	• Testing of TDR ,LDR	EIF101-1,2,3
4.	Capacitor and its types	• Identify different types of fixed capacitors. • Test the values of capacitors using Colour coding and by printed values.	EIF101-1,2,3
5.	Inductor and its types	• Identify the type of inductor. • find out the value of inductance using color code	EIF101-1,2,3
6.	Types of cables	• To identify different types of cables.	EIF101-1,2,3

7.	Connectors and its types	• To identify different types of connectors.	EIF101-1,2,3
8.	Switches and its Types	• To identify different types of switches, • Test the switches. • Measurement of contact resistance of switches.	EIF101-1,2,3
9.	PCB Designing	• To prepare one electronic project on single sided PCB & test it	EIF 101-4
10.	Visit	• Visit to any PCB manufacturing industry & prepare visit report.	EIF 101-4
11.	Mini Project(Compulsory)	• Group of 3 students will build a mini project as guided by teacher.	EIF 101-1,2,3,4

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 .

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.	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

b) Criteria for assessment at semester end oral 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 oral	10
2	Correct figures / diagrams	10
3	Presentation	05
	Total	25

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

REFERENCE MATERIAL :

a) Books / Codes

Sr.No.	Author	Title	Publisher
1	Dhir	Electronic Components and Materials	Tata McGraw Hill
2	Grover & Jamwal	Electronic Components and Materials	Dhanpat Rai & Sons,
3	Walter C. Bosshart	Printed Circuit Boards	Tata McGraw Hill
4	Madhuri Joshi	Electronic Components and Materials	Shroff Publishers & Distributors private ltd.
5	Williams	Build your own printed circuit board with CD	Tata McGraw-Hill
6	Thomas H. Jones	Electronic Components Handbook	Reston Publishing Company
7	Harper (Charles A.)	Handbook of components for electronics	Laxmi Enterprises ,Bombay

b)Websites:

1) **http://www.electronica-india.com/**
2) **http://electronicsclub.info/**
3) **http://nptel.ac.in**

COURSE ID :

Course Name : ENGINEERING PHYSICS (EE/IE/IF/ET)
Course Code : CCF102
Course Abbreviation : FPHB

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	Practical (3 hours)	--	
Marks	20	--	80	50 I	--	150

* Assessment as per pro-forma 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 principles of Physics to solve engineering problems as follows :

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 :

CCF102-1 Select proper material in engineering industry by analysis of its physical properties

CCF102-2 Use basic principles of wave motion for related engineering applications

CCF102-3 Use nanotechnology for quality improvement of materials

CCF102-4 Apply principles of optics, electricity to solve engineering problems

CCF102-5 Use LASERs, X-rays and photocell based equipments

CCF102-6 Apply principles of fiber optics 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 **]**

Competency and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Apply principles of Physics to solve engineering problems.	3	-	2	-	-	-	-	-	-	-	1	1
CCF102-1 Select proper material in engineering industry by analysis of its physical properties	3	-	2	-	-	-	-	-	-	-	-	1
CCF102-2 Use basic principles of wave motion for related engineering applications	3	-	2	-	-	-	-	-	-	-	1	1
CCF102-3 Use nanotechnology for quality improvement of materials	3	-	1	-	-	-	-	-	-	-	1	1
CCF102-4 Apply principles of optics, electricity to solve engineering problems	3	-	3	-	-	-	-	-	-	-	1	1
CCF102-5 Use LASERs, X-rays and photocell based equipments	3	1	2	-	-	-	-	-	-	-	1	1
CCF102-6 Apply principles of fiber optics for related engineering applications	3	1	2	-	-	-	-	-	-	-	1	1

CONTENT :

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCF102-1 Select proper material in engineering industry by analysis of its physical properties			
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** 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 2.3.3 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 2.3.6 Applications of surface tension **No numericals on above topic**	**16** (02) (06) (08)	**18** (02) (06) (10)

CCF102-2 Use basic principles of wave motion for related engineering applications			
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**
CCF102-3 Use nanotechnology for quality improvement of materials			
4	**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**	**04**	**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.			

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF102-4 Apply principles of optics, electricity to solve engineering problems		
5	**PROPERTIES OF LIGHT** 5.1 Refraction of light 5.2 Laws of Refraction of Light, Snell's law 5.3 Refraction through glass prism 5.4 Derivation of prism formula 5.5 Dispersion & Dispersive Power 5.6 **Numerical problems**	**06**	**06**
6	**ELECTRICITY** 6.1 Concept of electric current , resistance 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**	**06**	**08**
	CCF102-5 Use LASERs, X-rays and photocell based equipments		
7	**MODERN PHYSICS** **7.1 PHOTO ELECTRIC EFFECT** 7.1.1 Plank's hypothesis 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 7.2.2 Properties of laser 7.2.3 Spontaneous and stimulated emission 7.2.4 Population inversion and optical pumping 7.2.5 Applications of LASER **No numericals on above topic** **7.3 X-RAYS** 7.3.1 Nature and properties of x-rays. 7.3.2 Production of x-rays by Coolidge tube 7.3.3 Applications of x-rays **No numericals on above topic**	**14** (06) (04) (04)	**18** (08) (06) (04)

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
CCF102-6 Apply principles of fiber optics for related engineering applications			
8	**FIBER OPTICS** 8.1 Optical communication link 8.2 Principle of optical fiber (TIR) 8.3 Structure of optical fiber 8.4 Propagation of light in optical fiber 8.5 Advantages of optical fibers over conventional metal conductors 8.6 Applications of optical fibers **No numericals on above topic**	**06**	**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.			

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

Section / Topic no.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total marks
		Remember	Understand	Application		
I/1	Elasticity	2	4	2	CCF102-1	08
I/2	Properties of liquids	10	6	2	CCF102-1	18
I/3	Wave motion	4	2	2	CCF102-2	08
I/4	Nanotechnology	2	4	-	CCF102-3	06
II/5	Properties of light	2	2	2	CCF102-4	06
II/6	Electricity	2	2	4	CCF102-4	08
II/7	Modern Physics	8	8	2	CCF102-5	18
II/8	Fiber Optics	2	4	2	CCF102-6	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 Applications of Physics	i) Information search ii) Information presentation	CCF102-1 To CCF102-6
(Any 10 of the following experiments)			

2	To measure dimensions of given objects by using Vernier Caliper	i) Determine least count and zero error in the measuring instrument. ii) Measuring internal and external dimensions of given objects iii) Handling the measuring instruments for measuring depth, thickness etc. iv) Tabulating observations.	CCF102-1
3	To measure the diameter of bob and thickness of plate by using Micrometer screw gauge	i) Determine least count and zero error in the measuring instrument. ii) Measuring dimensions of given objects iii) Handling the measuring instruments for measuring depth, thickness etc. iv) Tabulating observations.	CCF102-1
4	To determine the viscosity of liquid by Stokes method.	i) Measuring diameter of steel ball using micrometer screw gauge. ii) Measuring terminal velocity of steel ball in the liquid column. iii) Use of stop watch for measurement of time. iv) Tabulating observations.	CCF102-1
5	To determine the surface tension of liquid by capillary rise method	i) Focusing the microscope properly in order to get clear image. ii) Adjusting cross wires of microscope at particular place. iii) Taking readings for main scale and Vernier scale of traveling microscope. iv) Tabulating observations.	CCF102-1
6	To measure unknown resistance of wire by Ammeter – Voltmeter method.	i) Drawing the circuit diagram of the required experiment. ii) Connecting the instruments as per circuit diagram. iii) Measuring the value of potential difference & current in the circuit. iv) Tabulating observations.	CCF102-4
7	To verify Snell's law using glass slab	i) Drawing necessary ray diagram ii) Measuring angles of incidence and refraction iii) Tabulating observations.	CCF102-4
8	To determine refractive index of prism by pin method	i) Removing parallax between the images and t pins by observing the refracted ray through prism. ii) Measuring the angle of refraction correctly iii) Drawing the path of refracted ray through t prism iv) Drawing inference regarding relation betwe angle of incidence & angle of refraction from δ graph v) Tabulating observations.	CCF102-4
9	To determine velocity of sound by resonance tube	i) Adjusting the resonating length by discriminating resonating sound from sound produced by the tuning fork. ii) Measuring internal diameter of resonating tube using vernier caliper iii) Drawing inference & confirming Law nL = constant	CCF102-2

		iv) Tabulating observations.	
10	To study characteristics of photocell	i) Drawing circuit diagram ii) Handling different delicate instruments. iii) Tabulating observations iv) Drawing graph	CCF102-5
11	To determine the acceleration due to gravity by 'g' by simple pendulum	i) Measuring length of pendulum ii) Finding least count of stopwatch iii)Measuring periodic time with the help of stop watch iv) Tabulating observations.	CCF102-2
12	To measure unknown resistance by Wheatstone's meter bridge.	i) Drawing the circuit diagram for series connections of the resistances. ii) Connecting the resistances for series method as per circuit diagram. iii) Finding the correct position of null point & measuring correct balancing lenses on Meter bridge. iv)Tabulating observations.	CCF102-4

C) INDUSTRIAL EXPOSURE

Sr. No.	Mode of Exposure (Visit/Exp.Lect/Ind.Survey/…)	Topic
1.	Field applications in theory lectures in every topic	All topics in course syllabus
2.	Practical exercise on overview of field applications of Physics	Part of term work

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

c) 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
	Observations, calculations & Result table	05
Psychomotor	Operating Skills	05
	Neat & complete circuit Diagram / schematic Diagram.	05
Affective	Discipline and punctuality Decency and presentation	5
TOTAL		**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

d) Criteria for assessment at semester end PRACTICLE 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

REFERENCE MATERIAL :

a) Books / Codes

Sr. o.	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
ii) http://scienceworld.wolfram.com/physics/
iii) http://physics.about.com/

*** * ***

COURSE ID:

Course Name : BASIC ELECTRONICS
Course Code : EIF 103
Course Abbreviation : FBTX

TEACHING AND EVALUATION SCHEME:

Prerequisites : NIL

Teaching Scheme:

Scheme Component	Hours/week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	**Progressive Assessment**		**Term End**			**Total**
	Theory	**Practical**	**Theory**	**Practical ***	**TW**	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	Practical (3 hours)	--	
Marks	20	--	80	50 I	--	150

I* Assessment as per pro-forma II I – Internal Examination

RATIONALE:

Although industrial electronics is specialized field of electronics engineering, a grasp of certain fundamental principles and concepts are essential pre- requisitions for it. This subject deals with the most basic devices and circuits on which the further development of subject depends.

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:

EIF 103-1 Identify characteristic of semiconductor of semiconductor and describe its operation as PN junction and zener diode .
EIF 103-2 Suggest appropriate rectifier and filter for industrial applications
EIF 103-3 Select different biasing methods of BJT to solve problem
EIF 103-4 Draw and interpret frequency response of BJT amplifier for different applications
EIF 103-5 Classify and suggest FET for given application.
EIF 103-6 Describe and test different regulator circuits.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Understand fundamental principle and concept of basic electronic devices	-	3	3	-	-	-	-	1	-	-	1	1
EIF103-1	2	-	-	-	-	-	-	1	-	-	1	1
EIF103-2	1	2	2	-	-	-	-	1	-	-	1	1
EIF103-3	1	2	2	-	-	-	-	1	-	-	1	1
EIF103-4	1	1	2	-	-	-	-	1	-	-	1	1
EIF103-5	1	1	2	-	-	-	-	1	-	-	1	1
EIF103-6	-	3	3	-	-	-	-	1	-	-	1	1

Section-I

Sr. No.	Topics	Teaching hours	Marks
EIF103-1 Identify characteristic of semiconductor of semiconductor and describe its operation as PN junction and zener diode			
1.	**Semiconductor Diode** 1.0 Conductor , Insulator, semiconductor 1.0.1 Band theory 1.0.2Intrinsic semiconductor : Si , Ge 1.0.3Doping 1.0.4 Extrinsic semiconductor : P type , N type 1.1 P.N. junction diode – Ge & Si 1.1.1 Constructional features. 1.1.2 Operating principle. 1.1.3 Characteristics. 1.1.4 Applications. 1.1.5 Specifications. 1.2 Zener diode 1.2.1 Constructional features. 1.2.2 Operating principles. 1.2.3 Characteristics 1.2.4 Specifications. 1.2.5 Applications	**10**	**14**
EIF103-2 Suggest appropriate rectifier and filter for industrial applications .			
2.	**Rectifier, Filter** 2.0 Half wave rectifier - working, Ripple factor, Efficiency Consideration. 2.1 Full wave rectifier - classification, working ripple factor, efficiency consideration. comparison of all rectifier. 2.2 Filter - study of shunt capacitor, series Inductor, LC, Filter., CLC filter.	**10**	**12**
EIF103-3 Select different biasing methods of BJT to solve problem			
3.	**Bipolar Junction Transistor(BJT)** 3.0 Introduction.3.1 Constructional features. 3.2 Operating principles of NPN & PNP Transistor 3.3 Transistor configurations & Modes of operation 3.4 Transistor input & output characteristic of CE & CB configuration. 3.5 Specifications of transistor and relation between α & β 3.6 Switching action of transistor (NUMERICALS BASED ON RELATION OF IC,IE & IB)	**12**	**14**

Section II

Sr. No.	Topics	Teaching hours	Marks
	EIF103-4 Draw and interpret frequency response of BJT amplifier for different applications		
4.	**Biasing of transistor and Single amplifier** 4.1 Q Point & stability 4.2 DC & AC Load Line 4.3 Transistor Biasing Methods-Circuit ,Equations, advantages & disadvantages Of 4.3.1 Fixed Bias Circuit 4.3.2 Fixed Bias with Emitter Resistor 4.3.3 Collector to Base Bias Circuit 4.3.4 Voltage Divider Bias Circuit 4.4 Study of single stage amplifier. 4.4.1 Diagram 4.4.2 Working 4.4.3 Input Output Waveform	**12**	**14**
	EIF103-5 Classify and suggest FET for given application		
5	**Field Effect Transistor (FET)** 5.0 Classification of FET 5.1 Study of JFET 5.1.1 Construction details. 5.1.2 Working principle 5.1.3 Characteristics 5.1.4 JFET parameters and relation between μ,rd & gm 5.2 Comparison between JFET and BJT 5.3 Study of MOSFET:-Types,symbol,working principle, applications ○ Specifications of FET	**12**	**14**
	EIF103-6 Describe and test different regulator circuits.		
6.	**Regulated Power Supply** 6.1 Block diagram of Regulated power supply. 6.2 Zener diode as a voltage regulator, Emitter follower regulator. 6.3 Transistor Series Voltage Regulator 6.4 Transistor Shunt Voltage Regulator 6.5 Study of IC 78xx & IC 79xx series of voltag regulators 6.6. Study of a LM317 and IC 723 internal block diagram and pinout features.	**08**	**12**
	Total	**64**	**80**

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:

SR. NO.	Name of the Topic	Distribution Of Marks (level wise)			Course Outcome	Total Marks
		Knowledge	Comprehension	Applications		
1	Semiconductor diode	08	02	02	EIF103-1	12
2	Rectifier, filter	08	04	02	EIF103-2	14
3	Bipolar junction Transistor(BJT)	10	02	02	EIF103-3	14
4	Single & Multistage Amplifier	12	02	-----	EIF103-4	14
5	Field effect Transistor.(FET)	12	-----	02	EIF103-5	14
6	Regulated Power supply	08	02	02	EIF103-6	12
				TOTAL		80

B)TERMWORK : Term work shall consist of the following :

(Minimum Eight From List)

Laboratory experiences and related skills developed

Sr.no	**Laboratory experiments**	**Skills developed**	**Course Outcome**
1	Characteristics of semiconductor junction diode.	1) Connect the various component as per the circuit diagrams using proper size wires 2) Write the forward & reverse voltage & current 3) Draw the forward & reverse characteristics	EIF103-1
2	Characteristics of Zener diode.	1) Connect the various component as per the circuit diagrams using proper size wires 2) Write the forward & reverse voltage & current 3) Draw the forward & reverse characteristics	EIF103-1
3	Zener diode as voltage regulator and regulation characteristics	1) Connect the various component as per the circuit diagrams using proper size wires 2) Write the percentage of regulation	EIF103-1
4	Input, Output characteristics of common base configuration.	1) Write input & output voltage & current 2) Make proper connection as per circuit diagram 3) Draw the input & output characteristics	EIF103-3
5	Input, output characteristics of common emitter configuration.	1) Write input & output voltage & current 2) Make proper connection as per circuit diagram 3) Draw the input & output characteristics	EIF103-3

6	Waveform observation, Vdc, ripple calculation, of half wave rectifier.	1) Make proper connection as per circuit diagram 2) Write Vdc & ripple voltage 3) To show the waveform on C.R.O.	EIF103-2
7	Waveform observation, Vdc, ripple calculation of centre - tapped full wave rectifier	1) Make proper connection as per circuit diagram 2) Write Vdc & ripple voltage 3) To show the waveform on C.R.O.	EIF103-2
8	Waveform observation, Vdc, ripple calculation of Bridge - full wave rectifier	1) Make proper connection as per circuit diagram 2) Write Vdc & ripple voltage 3) To show the waveform on C.R.O.	EIF103-2
9	To Study RC coupled Amplifier	1) To observe the frequency response of RC coupled amplifier.	EIF103-4
10	Static characteristics of FET	1) Make proper connection as per circuit diagram 2) Measure drain voltage & current and also measure Vgs & Vds draw characteristics	EIF103-5
11	Mini Project(Compulsory)	Build any circuit mounted on general PCB in a group of 3 students	EIF103-1,2,3,4,5.6

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 as per given criteria .

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 :

Particulars	**Marks**
1. Attendance	05
2. Correct figures/circuit diagrams/drawings	04
3. Proper observations and result table	04
4. Sample calculations with relevant formulae	04
5. Proper graphs and phasor diagrams	04
6. Procedure/workmanship/safety	04
Total	25

f) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Correct figures / diagrams/ Flow chart	20
2	Result table / calculations / graphs	20
3	Safety / use of proper tools / workmanship	10
	Total	50

*Assessment at semester end practical exam as per Pro-forma II.

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	A. Motershed	Electronics Devices & Circuits	PHI Publication
2.	Malvino	Electronics Principles	McGraw Hill
3	V. K. Mehta	Principles of Electronics	S.Chand
4	G. K. Mithal	Applied Electronics	Khanna Publication
5	B. L. Theraja	Basic Electronics	S.Chand

b) Websites:
1) **www.allaboutcircuits.com**
2) **www.electronicstheory.com**
3) **www.electronicstutorial.com**

COURSE ID :

Course Name : CHEMISTRY OF ENGINEERING MATERIALS
Course Code : CCF104
Course Abbreviation : FCHB

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <nil>
Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	Practical (2 hours)	--	
Marks	20	--	80	50 I	--	150

*** Assessment as per pro-forma II.**

RATIONALE:

This course provides knowledge of chemical properties of materials and selection of appropriate material for specific applications in the field of engineering. Study of different polymers, insulators or dielectrics, adhesives and their applications in electrical appliances, electronic industries etc., study of corrosion and methods of prevention will make students realize importance of care and maintenance of machines and equipments. The contents of this subject are designed to enhance student's reasoning capacity and capabilities in solving challenging problems in engineering field.

COMPETENCY:

Apply principles of advanced chemistry to solve engineering problems.

Cognitive: Understanding concepts of chemistry for applications in the area of engineering.

Psychomotor:

i) Sketching and labeling the diagrams for extraction of copper
ii) Experimentally analyzing the water samples for preparing potable water by different methods.
iii) Preparing chart of showing percentage, composition, properties and industrial applications of solders.

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

COURSE OUTCOMES:

CCF104-1 Apply the basic principles of chemistry in Engineering field.

CCF104-2 Use electrochemistry for electroplating and electro-refining as industrial applications.

CCF104-3 Interpret the reasons of corrosion suggesting remedies using appropriate techniques.

CCF104-4 Use relevant water treatment process to solve industry problems.

CCF104-5 Select proper type of cell based on the requirement in electrical/ electronic and computer engineering.

CCF104-6 Assist in monitoring extraction of copper.

CCF104-7 Select insulators, polymer, adhesives, composite materials for different applications in electronics engineering.

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 and COs	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Apply principles of advanced chemistry to solve engineering problems	3	-	3	-	-	-	-	-	-	-	1	1
1 Apply the basic principles of chemistry in Engineering field.	3	-	3	-	-	-	-	-	-	-	-	-
CCF104-2 Use electrochemistry for electroplating and electro-refining as industrial applications.	3	-	3	-	-	-	-	-	-	-	-	-
CCF104-3 Interpret the reasons of corrosion suggesting remedies using appropriate techniques.	3	-	3	-	-	-	-	-	-	-	-	-
CCF104-4 Use relevant water treatment process to solve industry problems	3	-	3	-	-	-	-	2	-	-	-	-
CCF104-5 Select proper type of cell based on the requirement in electronic and computer engineering	3	-	3	-	-	-	-	1	-	-	-	-
CCF104-6 Assist in monitoring extraction of copper..	3	-	3	-	-	-	-	3	-	1	-	-
CCF104-7 Select insulators, polymer, adhesives, composite materials for different applications in electronics engineering.	3	-	2	-	-	-	-	2	-	1	1	1

CONTENT:

A. THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF104-1 Apply the basic principles of chemistry in Engineering field.		
1	**ATOMIC STRUCTURE** 1.1 Atom :Fundamental particles 1.2 Atomic Number, Mass Number, Atomic weight, Isotopes and isobars 1.3 Hund's rule of maximum multiplicity 1.4 Pauli's exclusion principle 1.5 Aufbau's principle 1.6 Rules of distribution of planetary electrons 1.7 Electronic configuration of atoms with atomic number 1-30 1.8 Electronic configuration of Inert gases and their characteristics 1.9 Lewis and Langmuir's concept of stable electronic configuration 1.10 Electovalency and Co-valency 1.11 Formation Of electrovalent compounds-NaCl, MgO 1.12 Formation of Covalent compounds-H_2O,CO_2	**07**	**08**
	CCF104-2 Use electrochemistry for electroplating and electro-refining as industrial applications.		
2	**ELECTROCHEMISTRY** 2.1 Definitions- Conductor, Electrolyte,Electrode 2.2 Difference 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 Cu	**07**	**08**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	2.8 Faraday;s Laws of Electrolysis 2.9 Numerical problems based on Faraday's laws		
CCF104-3 Interpret the reasons of corrosion suggesting remedies using appropriate techniques.			
3.	**CORROSION AND PROTECTIVE COATING** 3.1 Introduction 3.2 Definition 3.3 Types of corrosion 3.4 Dry or Atmospheric corrosion 3.4.1 Oxide Film Formation & its types 3. 4.2 Factors affecting atmospheric corrosion 3.5 Wet or electrochemical corrosion 3.5.1 Galvanic Corrosion 3.5.2 Factors influencing immersed corrosion 3.5.3 Nature of the Metal 3.5.4 Nature of Corroding environment 3.5.5 P^H value 3.6 Methods of protection of metal from corrosion 3.6.1. Hot dipping (Galvanizing & Tinning). 3.6.2 Metal spraying. 3.6.3 Metal cladding. 3.6.4 Cementation or Sherardizing	**07**	**08**
CCF104-4 Use relevant water treatment process to solve industry problems.			
4	**WATER** 4.1 Impurities in natural water 4.2 Hard water & Soft water 4.3 Hardness of water- Temporary & Permanent, its units 4.4 Reactions of hard water with soap 4.5 Disadvantages of hard water for domestic purpose 4.6 Disadvantages of hard water for Industrial purpose 4.6.1 Textile Industry 4.6.2 Sugar Industry 4.6.3 Paper Industry 4.6.4 Dying Industry 4.7 scale & Sludge formation	**11**	**16**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	4.8 Causes of scale formation in boilers , it's disadvantages & removal of scale 4.9 Sterilization of water 4.9.1 Chlorination –by Cl_2, bleaching powder, chloramine with chemical reactions 5.0 Ion Exchange method to remove total hardness of water 5.1 pH definition, pH scale , applications of pH in boiler, sugar industry & sewage		
	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 II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
CCF104-5 Select proper type of cell based on the requirement in electrical/ electronic and computer engineering.			
5	**CELL AND BATTERIES** 5.1 Definition of Electrochemical cell, Battery, Charge, Discharge, Closed Circuit Voltage, Electrochemical couple,Internal resistance, Open Circuit Voltage, Separator, E.M.F. 5.2 Classification of Batteries such as – Primary, Secondary and Reserve Batteries 5.3 Construction, Working and Applications of a Primary Cell such as Dry Cell , Secondary Cell such as Lead Acid Storage Cell 5.4 Charging and Discharging of Lead Acid Storage Cell 5.5 Hydrogen-Oxygen fuel cell, its chemical reactions &advantages 5.6 Introduction of solar cell	08	08
CCF104-6 Assist in monitoring extraction of copper.			
6	**METALLIC CONDUCTORS** 6.. 1 Occurrence of metals 6.2 Distinction between mineral & ore 6.3 Definition of flux, Gangue & Slag 6.4 Steps involved in metallurgy-Flow chart 6.4.1 Concentration of ores—Physical Methods 6.4.2 Gravity Separation Method 6.4.3 Electromagnetic separation 6.4.4 Froth floatation method 6.5 Chemical Methods 6.5.1 Calcination & Roasting . 6.6 Important ores of copper Metallurgy of copper-Extraction of copper from copper pyrites by concentration , roasting, smelting , Bessemerisation ,Electrorefining 6.7 Physical chemical properties (action of air ,water &acids) 6.8. Uses of Copper	**12**	**14**
7	**SOLDERS** 7.1 Definition of alloy , classification of alloys & purposes of making alloy	**03**	**06**

	7.2 Composition, properties & applications of 7.2.1 Soft solder. 7.2.2 Tinmann's solder, 7.2.3 Brazing alloy , 7.2.4 Plumber's solder 7.2.5 Rose metal .		
8	***SEMICONDUCTORS*** 8.1 Definition of semiconductor 8.2 Properties &Applications of Semiconductors such as 8.2.1 Silicon 8.2.2 Germanium 8.2.3 Selenium 8.2.4 Graphite 8.2.5 Silicon carbide 8.2.6 Cadmium sulphide	**02**	**04**
CCF104-7 Select insulators, polymer, adhesives, composite materials for different applications in electronics engineering.			
9	***CHEMISTRY OF NONMETALLIC ENGINEERING MATERIALS*** ***INSULATORS*** 9.1.1 Definition of insulator,Dielectrics 9.1.2 Characteristics of good insulator 9.1.3 Classfication of insulating materials-solid ,liquid , gases 9.1.4 Preparation,properties & uses of glass wool, Thermocole 9.1.5 Properties & uses of Asbestos ,Ceramics ,glass, mica **9.2 POLYMERS** 9.2.1 Definition of Polymer ,Polymerization , types of polymerisation 9.2.2 Preparation ,properties & uses of Teflon & Epoxy resin **9.3 ADHESIVES** 9.3.1 Definition of Adhesives 9.3.2 Characteristics of good Adhesives 9.3.3 Properties & uses of Adhesives. **9.4 COMPOSITE MATERIALS** 9.4.1 Introduction 9.4.2 Definition 9.4.3 Classification 9.4.4 Properties 9.4.5 Application	**07**	**08**
	TOTAL	**32**	**40**

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

Section / Topic no.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total marks
		Remember	Understand	Application		
I / 1	Atomic structure	06	02	-	CCF104-1	08
I / 2	Electrochemistry	02	02	04	CCF104-2	08
I / 3	Corrosion &protective coating	04	02	02	CCF104-3	08
I / 4	Water	08	04	04	CCF104-4	16
II/5	Cell & Batteries	04	02	02	CCF104-5	08
II/6	Metallic conductors	08	03	03	CCF104-6	14
II/7	Solders	02	02	02	CCF104-6	06
II/8	Semiconductors	02	02	-	CCF104-6	04
II/9	Chemistry of nonmetallic engg. materials	02	02	04	CCF104-7	08
	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 :

Laboratory experiments and related skills to be developed :

Sr. No.	Title of Experiment	Skills/Competencies to be developed	Course Outcome
1	Introduction to Chemistry laboratory	Awareness of chemicals glasswares &instruments used in chemistry laboratory	CCF104-1
2	Preparation of 1 N, 0.5 N & 0.1 N Solutions of different chemicals like NaOH, HCI, Oxalic acid, $FeSO_4$, etc.	Skill of weighing, handling Glassware & measuring solutions	CCF104-1
3	Titration of strong acid and strong bases (HCl X NaOH)	Skills of determining accurate end point of titration & development of measurement skills.	CCF104-1
4	Titration of strong acid,strong base& weak acid (HCI X NaOH X $H_2C_2O_4.H_2O$	Skills of determining accurate end point of titration & development of measurement skills.	CCF104-1
5	Titration of weak base , strong acid & strong base	Skills of determining accurate end point of titration &	CCF104-1

	(Na_2CO_3X H_2SO_4 X KOH	development of measurement skills.	
6	Estimation of chloride content in water by Mohr' s method	Measurement skill utilization of practical data for testing & estimation	CCF104-4
7	Determination of amountof Ca and Mg ions present in given sample of water by E.D.T.A method	Measurement skill utilization of practical data for testing & estimation	CCF104-4
8	Estimation of viscosity of oils by Ostwald's method	Measurement skill utilization of practical data for testing & estimation	CCF104-1
9	Estimation of Ca in limestone.	Measurement skill utilization of practical data for testing & estimation	CCF104-6
10	Estimation of % of Fe in given sample of steel	Measurement skill utilization of practical data for testing & estimation	CCF104-6
11	Report of expert lectures demo	Application of chemistry in engineering field	CCF104-6
12	Report of market survey	Collection of data	CCF104-4

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
	Application	05
Psychomotor	Operating Skills	10
	Writing skills	10
Affective	Discipline and punctuality	10
	Timeliness and accuracy	10
TOTAL		**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
	Application	05
Psychomotor	Operating Skills	05
	Writing skills	05
Affective	Discipline and punctuality Timeliness and accuracy	05
TOTAL		**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	Topic
1.	Lecture demos by industry experts	Chapter of theory syllabus
2.	Market survey of apparatus and chemicals	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. Rangawala	Engineering materials	Engineerin publication
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

i) www.substech.com
ii) www.kentchemistry.com
iii) www.chemcollective.org
iv) www.wqa.org
v) www.chemistry teaching.com

*** * ***

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	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	NIL	--	
Marks	20	--	80	NIL	--	150

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 as follows -

1.Cognitive: To understand the mathematical concepts

2. Psychomotor: Proper handling 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]

Competency and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long leaning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Apply principles of Basic Mathematics to solve mathematical problems	3	-	1	-	-	-	-	-	-	-	1	1
CCF105-1 : To solve simultaneous equations using Cramer's rule.	3	-	1	-	-	-	-	-	-	-	1	1
CCF105-2 : To resolve a given function into partial fractions.	3	-	1	-	-	-	-	-	-	-	1	1
CCF105-3 : To solve simultaneous equations by using inverse of matrix method.	3	-	1	-	-	-	-	-	-	-	1	1
CCF105-4 : To expand any binomial expression for positive integral index.	3	-	1	-	-	-	-	-	-	-	1	1
CCF105-5 : To memorize and solve problems using trigonometric formulae.	3	-	1	-	-	-	-	-	-	-	1	1

CONTENT :

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF105-1 : To solve simultaneous equations using Cramer's rule		
1	**Determinants** 1.1 Definition of nth order determinant 1.2 Expansion of second and third order determinants 1.3 To solve simultaneous equations having 3 unknowns using Crammer's Rule 1.4 Consistency of equations using Determinants	**04**	**06**
	CCF105-2 : To resolve a given function into partial fractions		
2	**Partial Fractions** 2.1 Definition of rational, proper and improper fractions 2.2 Various cases of Partial fractions and Examples	**06**	**12**
	CCF105-3 : To 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 3.4 Minor and Co-factor of an element of a matrix 3.5 Adjoint and Inverse of a matrix 3.6 Solution of simultaneous equations by Inverse of a matrix method	**10**	**16**
	CCF105-4 : To expand any binomial expression for positive integral index.		
4	**Binomial Theorem** 4.1 Statement of theorem for positive integral power 4.2 Expansion 4.3 Simple Examples on expansion	**04**	**06**
	Total	**24**	**40**

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)
	CCF105-5 : To memorize and solve problems using trigonometric formulae.		
5	**Trigonometric Ratios and Identities** 5.1 Fundamental Identities(Simple examples) 5.2 Definition of radian measure 5.3 Conversion of degree into radian and vice versa of standard angles	**02**	**04**
6	**Trigonometric ratios of Compound and Allied Angles** 6.1 Proofs of sine ,cosine and tan of (A+B) and (A-B) 6.2 Examples	**06**	**08**
7	**Trigonometric ratios of Multiple Angles** 7.1 Proofs of sine, cosine and tangent of 2θ, 3θ 7.2 Examples	**05**	**10**
8	**Factorization and Defactorization Formulae** 8.1 Proofs of above formulae 8.2 Examples	**04**	**08**
9	**Inverse Trigonometric Ratios** 9.1 Definition 9.2 Principle value 9.3 Proof of standard formulae 9.4 Examples	**07**	**10**
	Total	**24**	**40**

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 No.	Name of topic	Distribution of marks (level wise)			Course Outcomes	Total Marks
		Knowledge	Comprehension	Application		
1	Determinants	-	2	4	CCF105-1	06
2	Partial Fractions	2	2	8	CCF105-2	12
3	Matrices	2	2	12	CCF105-3	16
4	Binomial Theorem	2	-	4	CCF105-4	06
5	Trigonometric Ratios and Identities	2	-	2	CCF105-5	04
6	Allied Angles	2	2	4	CCF105-5	08
7	Compound Angles	2	-	8	CCF105-5	10
8	Factorisation & De-factorisation angles	2	-	6	CCF105-5	08
9	Inverse Trigonometric ratios	2	2	6	CCF105-5	10
TOTAL		16	10	54		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) TUTORIALS

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

INSTRUCTIONA 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	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	

Evaluation Scheme :

…

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	---	--	
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. Engineerig mathematics lays the foundation to understand technical principles in various fields.

COMPETENCY:

Apply principles of Engineering Mathematics to solve Engineering problems as follows-

1.Cognitive: Understanding and applying 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(CO's) :

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 **]**

Competency and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long leaning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Apply principles of Engineering Mathematics to solve Engineering problems	3	-	1	-	-	-	-	-	-	-	2	2
CCF106-1 : To solve problems on two dimensional co-ordinate geometry for straight line and circles.	3	-	1	-	-	-	-	-	-	-	-	-
CCF106-2 : To find approximate solution of algebraic equations and simultaneous equations by various methods.	3	-	1	-	-	-	-	-	-	-	1	1
CCF106-3 : To find limits of different types of functions using various methods.	3	-	1	-	-	-	-	-	-	-	1	1
CCF106-4 : To solve the problems of maxima, minima and geometrical applications.	3	-	1	-	-	-	-	-	-	-	1	1

CONTENT:
THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF106-1 : To solve problems on two dimensional co-ordinate geometry for straight line and circles.		
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**
	CCF106-2 : To find approximate solution of algebraic equations and simultaneous equations by various methods.		
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)
	CCF106-3 : To find limits of different types of functions using various methods.		
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 $x \to \infty$ 7.3 Limits of trigonometric functions by factorization, formula $\frac{\sin x}{x}$ as $x \to 0$, substitution .	**06**	**08**
	CCF106-4 : To solve the problems of maxima, minima and geometrical applications.		
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 8.4 Derivative of Inverse functions 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	**12**	**20**
9	**Applications Of Derivatives** 9.1 Geometrical meaning of derivative (To find equation of Tangent and normal) 9.2 Maxima and minima of functions	**03**	**06**
	Total	**24**	**40**

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

Topic No.	Name of topic	Distribution of marks (level wise)			Total Marks
		Knowledge	Comprehension	Application	
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 simultaneous Equations	2	2	16	20
5					
6	Functions	2	-	4	6
7	Limits	2	2	4	8
8	Differentiation	4	4	12	20
9					
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.

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

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 Algebraic & simultaneous Eq	Numerical solution of algebraic equations.
5		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 Derivatives.	To find equation of Tangent, Normal & To find Maxima and Minima of a function.

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 Polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan
4.	Sameer Shah	Engineering Mathematics	Tech-Max Publication, Pune
5.	A.M. Vaidya	Applied Mathematics	Central Techno

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

*** * ***

COURSE ID :

Course Name : BASIC ELECTRICAL ENGINEERING
Course Code : EIF107
Course Abbreviation : FBEE
Pre-requisite Course(s) : Nil

TEACHING AND EVALUATION SCHEME :
Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	05
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Oral*	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	Internal Oral Exam	--	
Marks	20	--	80	25I	--	125

I – Internal Examination ** Assessment as per Pro-forma I

Rationale:

The Diploma Course in Electronics & Telecommunication Engineering/Industrial Electronics involves the study of the basic concepts, rules and laws of Electric and Magnetic Circuits Electrical machines, equipments and instruments.
In industry maximum electrical equipments and machines are combined with electronics as well as remotely operated controlling. Hence the subject deals in understanding the working principle, construction, operation and applications of the various equipments and instruments; and Electrical machines.

Competency : Apply the basic principles of electrical engineering to solve electronic engineering problems.

Cognitive :i) Understanding and applying principles and laws of electrical engineering to simple practical problems/ situations. ii)Observing iii) Classifying iv) Interpreting
Psychomotor : Handling of instruments, apparatus and tools
Affective : Skill of i) Safety ii) curiosity, interest and self-confidence iii) working in team

Course outcomes:

EIF107-1 Apply basic laws and principles of electrical engineering to electrical applications.
EIF107-2 Use magnetic principles to work on electrical devices.
EIF107-3 Use electromagnetic principles to make devices work.
EIF107-4 Use AC circuits in electronic devices.
EIF107-5 Use series and parallel AC circuits in applications.
EIF107-6 Assist work on three phase systems including transformers.

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 and Cos	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Understand fundamental principle and concept of basic electronic devices	2	-	3	-	-	-	-	-	-	-	1	1
EIF107-1	2	-	2	-	-	-	-	-	-	-	1	1
EIF107-2	2	-	2	-	-	-	-	-	-	-	1	1
EIF107-3	2	-	2	-	-	-	-	-	-	-	2	2
EIF107-4	2	1	2	-	-	-	-	-	-	-	2	2
EIF107-5	2	1	2	-	-	-	-	-	-	-	2	2
EIF107-6	2	1	2	-	-	-	-	-	-	-	1	1

CONTENT :

A) THEORY :

Section I

Chapter	Name of the Topics	Theory hours	Marks
EIF107-1 Apply basic laws and principles of electrical engineering to electrical applications.			
01	**Basic Concepts:** 1.1 Definition of Electric Current, Voltage. 1.2 Concept of Resistance, - Laws of Resistance, - Concept of Resistivity and Conductivity, 1.3 Classification of Electric Current: - Direct Current (DC) - Alternating Current (AC) 1.4 Ohm's Law, Concept of Voltage drop and Terminal Voltage 1.5 Kirchhoff's Laws - Kirchhoff's Current Law - Kirchhoff's Voltage Law **(Simple Numerical with maximum two equations)**	**08**	**12**
EIF107-2Use magnetic principles to work on electrical devices.			
02	**Magnetic Circuits:** 2.1 Magnetic Circuit - Ohm's law of Magnetic Circuit. 2.2 Definitions Concerning Magnetic Circuit. - Magneto-Motive-Force (MMF), Ampere Turns (AT), Reluctance, Permeance, Reluctivity. 2.3 Comparison Between Electric and Magnetic circuit. 2.4 Calculations of Amp.-Turns for simple Series, (Simple Numerical) 2.5 Concept of Leakage Flux, Useful Flux & Fringing. 2.6 Magnetization Curve (B - H Curve) - Magnetization Curve for Magnetic and Non-Magnetic Materials. - Magnetic Hysteresis, Hysteresis Loop. - Hysteresis Loops for Hard & Soft Magnetic Materials. - Area of Hysteresis Loop, Hysteresis Loss. (No Derivation and No Numerical) 2.7 Types of Magnets and their applications. - Permanent Magnet, Electromagnet.	**08**	**16**

EIF107-3 Use electromagnetic principles to make devices work.			
03	**Electromagnetic Induction:** 3.1- Faraday's Laws of Electromagnetic Induction. Faraday's First Law, Faraday's Second Law (No Numerical) 3.2 Induced E.M.F: Statically Induced E.M.F., Dynamically Induced E.M.F. (Simple Numerical) 3.3 Direction of Induced E.M.F. and Currents. - Fleming's Right Hand Rule, - Lenz's Law Self Induced E.M.F., Mutually Induced E.M.F. 3.4 Self Inductance 3.5 Coefficient of Self-induction (L), (Simple Numerical) 3.6 Mutual Inductance 3.7 Coefficient of Mutual Inductance (M) (Simple Numerical) 3.8 Energy Stored in Magnetic Field (No Derivation and No Numerical)	**08**	**12**
	TOTAL:	**24**	**40**

Section – II

Chapter	Name of the Topics	Theory hours	Marks
EIF107-4Use AC circuits in electronic devices.			
04	**A.C. Fundamentals** 4.1 Introduction. 4.2 Generation of Alternating EMFs. 4.3 Elementary Alternator. 4.4 Some important Terms.: cycle, time period, frequency, amplitude, average values 4.5 Equations of Alternating Voltages and Currents. 4.6 Effective or Root Mean Square (R.M.S.) Value of Sinusoidal Current or Voltage. 4.7 Peak Factor and Form Factor. 4.8 Phasor Representation of Alternating Quantities. 4.9 Phase and Phase Difference. 4.10 Phasor Diagrams. 4.11 Addition and Subtraction of Sinusoidal Alternating Quantities.(Simple Numerical) 4.12 Concept Of Lagging and Leading	**09**	**14**
EIF107-5Use series and parallel AC circuits in applications.			
05	**Series and Parallel AC Circuits** 5.1 Vector algebra-Representation of vector in rectangular form & polar form, conversion from rectangular to polar & polar to rectangular, addition, subtraction, multiplication & division of vector. 5.2 Series A.C. Circuits 5.2.1 Purely Resistive A.C. Circuit. 5.2.2 Purely Inductive A.C. Circuit. 5.2.3 Purely Capacitive A.C. Circuit. 5.2.4 Circuit with Resistance and Inductance in Series with concept of power factor 5.2.5Circuit with Resistance and Capacitance in Series with concept of power factor 5.2.6 Circuit with Resistance, Inductance and Capacitance in Series with concept of power factor 5.2.7 Active and reactive power in single phase series A.C. Circuits	**08**	**14**

EIF107-6 Assist work on three phase systems including transformers.			
06	**Three Phase A. C. Circuits.** 6.1 Polyphase System 6.2 Three Phase Supply Systems. 6.3.1 Phase Sequence 6.3.2 Three-Phase Three-Wire System. 6.3.3 Three-Phase Four-Wire System. 6.4 Types of connection of load star and delta	**03**	**06**
07	**Transformer** 7.1Transformer:Defination 7.2 Working principle of transformer 7.3Types of transformer according to a)Construction b)Function c) Number of phases 7.4 Applications of Transformer in Electronic Circuit **7.5Earthing** 7.5.1 Necessity of Earthing 7.5.2 Types of Earthing- Pipe earthing, Plate earthing	**04**	**06**
	Total	**24**	**40**

B]

TERM WORK: Laboratory experiments and related skills to be developed :
(Minimum Eight From List)

Sr. no	**Laboratory experience**	**Skills developed**	**Course outcomes**
1.	Study the effect of temperature on resistance of copper	1. Connect the various components as per the circuit diagrams by using wires 2. Calculate the resistance from the readings	EIF107-1
2.	To identify the nature of D.C. and A.C. voltage	To identify the nature of D.C. and A.C. voltage	EIF107-1
3.	Use of Rheostat as a current regulator & potential divider	1. Use the rheostat as a current regulator i.e. change the current in the circuit 2. Use the rheostat as a potential divider i.e. change the voltage across the circuit.	EIF107-1
4.	To plot the B H curve for magnetic material and determine the relative Permeability	1. Connect the various components as per the circuit diagrams by using wires 2. Plot the B-H curve from the readings 3. Determine the relative Permeability of the material.	EIF107-4

Sr. no	Laboratory experience	Skills developed	Course outcomes
5.	To verify Faraday's First Law of Electromagnetic Induction (For Dynamically & Statically Induced EMF)	1. Connect the apparatus as per the circuit diagrams . 2. Observe the deflection of galvanomETFr with respect to magnitude & direction. 3. Analyze the observations with law.	EIF107-5
6.	To find resistance and inductance of a choke coil	1. Connect the apparatus as per the circuit diagrams 2. To find resistance and inductance of a choke coil	EIF107-6
7.	To study R-L-C series circuit and R-L& C parallel circuit	1. Connect the apparatus as per the circuit diagrams 2. To study R-L-C series circuit and R-L& C parallel circuit	EIF107-6
8.	Study of Construction details & application of single phase transformer.	1. Observe the single phase transformer as per the construction. 2. Connect the single phase transformer to know the working.	EIF107-6

Specification Table For Question Paper of Theory Examination:

Section / Topic no.	Name Of the Topic	Distribution Of Marks (Level Wise)			Total Marks	Course outcomes
		Remember	Understanding	Applications		
I/1	Basic Concepts	04	04	04	12	**EIF107-1**
I/2	Magnetic Circuits	04	06	06	16	**EIF107-2**
I/3	Electromagnetic Induction	04	04	04	12	**EIF107-3**
I/4	A.C. Fundamentals	04	04	08	16	**EIF107-4**
II/5	Series and Parallel AC Circuits	04	04	08	16	**EIF107-5**
II/6	Three Phase A. C. Circuits.	02	--	06	08	**EIF107-6**
				TOTAL	**80**	

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.Slide 4. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Codes:

Sr. No.	Name of Book	Author	Publisher
1.	A Text Book of Electrical Technology Vol-I (Basic Electrical Engg.)	B. L. Theraja A. K. Theraja	S. Chand and Co.
2.	Basic Electrical Engg.	V. N. Mittle	Tata McGraw-Hill
3.	Electrical Technology	Edward Hughes	Pearson Education, New Delhi
4	Electrical Technology	V.K.Mehta	S. Chand and Co.

b) Websites

1) www.ece.rice.edu

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

3) aggregate.org/hankd/piaee12.pdf

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COURSE ID

Course Name : COMPUTER FUNDAMENTALS AND APPLICATIONS
Course Code : EIF 108
Course Abbreviation : FCFA

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL
Teaching Scheme: MPECS 2016

Scheme component	Hours / week	Credits
Theory	1	3
Practical	2	

Evaluation Scheme:

Mode of Evaluation	**Progressive Assessment**		**Term End Examination**			**Total**
	Theory	Practical	Theory Examination	Term Work	Practical Examination (Internal)	
Details of Evaluation	--	i. 25 marks for each practical ii. One PST of 25 marks	--	As per Proforma-V	As per Proforma-VI	
Marks	**--**	**--**	**--**	**25**	**50I**	**75**

RATIONALE:

Computers play a vital role in various fields like business, academics, defense, budget research, engineering, medicine. In the present Industrial & commercial environment, the technician is expected to use computers skillfully.The primary purpose of this course is to give an elementary but sound fundamental understanding of how computers work, its basic hardware software components, what basic applications of computer technology currently exist, how they work and basic knowledge and applications of Internet.

COMPETENCY

Cognitive : i) Identify the basic parts of a computer system and relationships among component.
ii) Describe characteristics and functions of CPU's, motherboard, RAM, expansion connection, hard drives and CD-ROM drives.

Psychomotor : i) Investigate computer system, Network & computer program ii) drawing flow chart for computer programs constructions

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

COURSE OUTCOMES:

EIF 108-1: State types of computers & its application

EIF 108-2: Relate functions of hardware & software components of a computer system

EIF 108-3: Compare basic differences of among operating systems

EIF 108-4: Illustrate computer programs, tools & languages

EIF 108-5: Demonstrate & Classify computer networks

EIF 108-6: Discover the importance of Internet and be able to safely surf on the Internet

EIF 108-7: Design files of word processors, spreadsheets, presentation software, and database application

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 and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency:	2	1	1	-	-	-	-	-	-	1	3	3
EIF 108-1: State types of computers & its application	1	-	-	-	-	-	-	-	-	-	2	2
EIF 108-2: Relate functions of hardware & software components of a computer system	1	-	1	-	-	-	-	-	-	1	2	2
EIF 108-3: Compare basic differences of among operating systems	-	1	1	-	-	-	-	-	-	1	3	3
EIF 108-4: Illustrate computer programs, tools & languages	-	2	2	-	-	-	-	-	-	1	2	3
EIF 108-5: Demonstrate & Classify computer networks	2	1	1	-	-	-	-	-	-	-	2	2
EIF 108-6: Discover the importance of Internet and be able to safely surf on the Internet	2	-	1	-	-	-	-	-	-	1	2	2
EIF 108-7: Design files of word processors, spreadsheets, presentation software, and database application	1	-	2	-	-	-	-	1	-	-	-	3

CONTENT:

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF 108 -1 : State types of computers & its application		
1	**INTRODUCTION TO COMPUTERS** 1.1 History of computers 1.2 Types of computers 1.3 Applications of computers –Education, Business, Medical, Engineering etc.	1	--
	EIF 108 -2 : Relate functions of hardware & software components of a computer system		
2	**SYSTEM UNIT** 2.1 System Board 2.2 Microprocessor 2.3 Memory and its types 2.4 Expansion cards	1	--
3	**HARDWARE COMPONENTS** 3.1 Input devices and its connections: Keyboard, Mouse, Scanner,Microphone 3.2 Output devices and its connections: Monitors, Printers, Projectors, Speakers 3.3 Storage devices: Hard disks, Magnetic Tapes,Optical Discs, Pen drive 3.4 Tips on "How to buy a computer".	2	--
	EIF 108 -3 : Compare basic differences of among operating systems		
4	**INTRODUCTION TO SOFTWARE** 4.1 Types of software 4.1.1 System software 4.1.2 Application Software 4.2 Introduction to Operating System 4.2.1 Definition: Operating System 4.2.2 Role of Operating System 4.2.3 Various Examples of Operating Systems	2	--
	EIF 108 -4 : Illustrate computer programs, tools & languages		
5	**COMPUTER PROGRAM** 5.1 Purpose of program planning 5.2 Algorithm 5.3 Flowchart 5.4 Pseudocode	2	--

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.5 Plan the logic of a computer program 5.6 Commonly used tools for program planning and their use		
6	**COMPUTER LANGUAGES** 6.1 Computer languages or programming languages 6.2 Three broad categories of programming languages- machine, assembly, and high-level languages 6.3 programming language tools - assembler, compiler, linker, and interpreter 6.4 Concepts of object-oriented programming languages	2	--
EIF 108 -5 : Demonstrate & Classify computer networks			
7	**COMPUTER NETWORKS** 7.1 Basic elements of a communication system 7.2 Data transmission modes 7.3 Data transmission speed & category 7.4 Data transmission media 7.5 Digital & Analog data transmission 7.6 Concept : Network 7.7 Types of Networks : LAN, MAN, WAN	2	--
EIF 108 -6 : Discover the importance of Internet and be able to safely surf on the Internet.			
8	**INTERNET & CYBER LAWS** 8.1 Internet basic terminology 8.2 Client, server concepts 8.3 Applications of Internet 8.4 Hardware & software requirements for internet connection 8.4 Various examples of Browsers 8.5 Browsing 8.6 Search Engines 8.7 Virus, Types of Viruses, Virus Protection 8.8 Introduction to Cyber Law 8.9 Information Technology Act of India 2000	2	--

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 108 -7 : Design files of word processors, spreadsheets, presentation software, database application			
9	**OFFICE AUTOMATION TOOLS** 9.1 MS-Word – Opening menus, toolbars, opening and closing documents, clipboard concept 9.2 MS – Excel – Working and manipulating data with excel, formulas, functions, chart and its types 9.3 MS – PowerPoint – Working with PowerPoint and presentation ,Changing layout, Graphs , Auto content wizard ,Slide show, Animation effects,Normal, outline, Slide sorter, Reading view.	2	--
	Total:	16	--

Laboratory experiments and related skills to be developed :
(Minimum Eight From List)

Sr. No.	Title of Experiment	Skills to be developed	Course outcome
1.	Understanding PC(system unit and connections of internal components)	1. Identify the front and rear panel components of CPU 2. Identify different components inside the CPU cabinet 2.1 Identify different components on motherboard. 2.2 Motherboard connection. 2.3 Graphics card connection. 2.4 Network interface card connection.	EIF108-1
2.	Understanding the storage devices	1. Study various secondary storage devices along with their capacities. 2. Connecting HDD, and CD, DVD drives. 3. Attaching USB devices. Care of the above devices.	EIF108-2
3.	Understanding the input/output devices and their connections	1. Study of connections of mouse, keyboard, monitor, printer. 2. Install driver software for a printer, Scanner 3. Set up a printer & scanner Scan a page, print a test page	EIF108-2
4.	Study of system software with basics of OS	1. Understanding the concept of system and application software. 2. Examples of system software. 3. Study of application software. 4. Understand the concept & functions of Operating system, Examples of Operating system Overview of Windows OS	EIF108-3
5.	Creating and Editing a word document	1. Use of menus and submenus. 2. Type and format the text matter in paragraphs. 3. Set up page size, margins 4. Insert headers and footers, bullets. 5. Use of borders and shading 6. Format picture, word-art, text box etc. 7. Typing text in multi-columns	EIF108-4

		Use of equation editor	
6.	Inserting table and Mail-Merge	Table: 1. Insert,format Table. 2. Sort data in table Mail-Merge: 1. Understand the mail-mergeFacility. 2. Create main document and edit it 3. Create & edit data source 4. Merge the main document anddata source. 5. Merge to file and merge to print.	EIF108-5
7.	Creating and Editing a work-book	1. Use of menus and submenus. 2. Enter the data in worksheet. 3. Creating a table in worksheet. 4. Use of editing commands. 5. Fill series by auto-fill handle, Insert / delete rows, columns and worksheet. Set up page size, margins.& set the print area.	EIF108-6
8	Understanding the basics of presentation software & Creating a new presentation	1. Insert new / duplicate slides 2. Create objects on a slide and use general editing operations. 3. Use of different views in presentation 4. Use standard templates for slides. Use preset animation, slide transition and Prepare speaker notes.	EIF108-7
9	Using advanced features of slide-show	1. Use of custom animation effect 2. Use of action buttons on slides 3. Rehearse time-setting of slide show	EIF108-7
10	Making use of Internet (Email, Chat, virus protection.)	1. Study of different types of networks. 2. Visit the website. 3. Using search engines. 4. Register online for e-mail ID. 5. Communicate with others using e-mail 6. Chatting	EIF108-8

		7. Installation, use and update of Anti-virus software Removing detected viruses	
11	Mini Project	Mini Project based on Microsoft office suite which incorporates presentation, database & spreadsheet handling, word processing skills.	EIF108-1 to EIF108-8

Progressive Skills Test :

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

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	10
2	Preparedness for practical	05
3	Neat & complete Diagram.	05
4	Observations & computer handling skill	05
5	Use of toolbar, menu bar and short cut keys.	05
6	Logical thinking and approach	10
7	Oral Based on Lab work and completion of task	10
	TOTAL	50

Assessment at semester end practical exam as per Pro-forma II.

Criteria for assessment at semester end practical exam:

Sr. no	Criteria	Marks allotted
1.	Technical ability	20
2.	Communication skill	10
3.	Logical approach	20
	TOTAL.	50

INSTRUCTIONAL STRATEGIES:

InstructionalMethods:

1. Lectures cum Discussions
2. Regular Home Assignments.
3.Laboratory experiences and laboratory interactive sessions

Teaching and Learning resources:

1. Chalk board 2. O.H.P. 3. Slides 4. Self-learning Tutors

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Sanjay Saxena	A first course in Computers 2003 edition	Vikas Publishing House Pvt Limited
2.	Anita Goel	Computer Fundamentals	Pearson Education India
3.	Sudipto Das	A Complete Guide to Computer Fundamentals	Laxmi Publications
4.	P.K.Sinha	Computer Fundamentals	BPB Publication

b) Websites

vi)http://mv.safaribooksonline.com
vii) http://www.edulearn.com
viii) http://kvsecontents.in/computer-fundamentals

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COURSE ID :

Course Name : ENGINEERING GRAPHICS
Course Code : CCF109
Course Abbreviation : FEGR

TEACHING AND EVALUATION SCHEME :

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

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	--	i. 25 marks for each practical ii. One PST of 25 marks	--	External Practical Exam (2 Hours Duration)	As per Profor maVI	
Marks	--	--	--	50 E	25	75

** Assessment as per Pro-forma – IV* *E-External Examination*

RATIONALE :

Engineering Graphics is one of the ways of communication among engineering professionals. It describes scientific facts, concepts, principles and techniques of drawing in any engineering fields to express the ideas and conveying the instructions which are use for carrying out tasks at work place. 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. So it is necessary to all programmes.

COMPETENCY: Read, draw & Interpret the engineering drawing of simple objects.

Cognitive : Understand various drawing procedures.

Psychomotor : Produce engineering drawing from the given problem.

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

COURSE OUTCOMES :

CCF109-1 Understand various fundamentals in engineering drawing.
CCF109-2 Produce the projection of point, lines& planes inclined to one reference plane.
CCF109-3 Produce orthographic drawing from given pictorial view.
CCF109-4 Produce sectional orthographic drawing from given pictorial view.
CCF109-5 Visualize & draw accordingly the pictorial view by correlating the given views.

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 and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency:	1	-	**1**	-	-	-	-	-	-	-	**3**	**2**
CCF109-1	1	-	1	**1**	-	-	-	-	-	-	**3**	-
CCF109-2	1	-	1	-	-	-	-	-	-	-	-	-
CCF109-3	1	-	1	-	-	-	-	-	-	-	**3**	-
CCF109-4	1	-	1	-	-	-	-	-	-	-	**3**	-
CCF109-5	1	-	1	-	-	-	-	-	-	-	**3**	-

CONTENT :

A) THEORY :

SECTION -I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF109-1Understand various fundamentals in engineering drawing		
1	**Introduction To Engineering Drawing** 1.1 Drawing Instruments and their uses 1.2 Standard sizes of drawing sheets 1.3 Letters and numbers (single stroke vertical) 1.4 Convention of lines and their applications 1.5 Scale (reduced, enlarged & full size) Plain scale and Diagonal scale. 1.6 Dimensioning technique as per SP-46 (Latest Edition) Types and applications of chain, parallel and Co-ordinate dimensioning 1.7 Introduction to CAD software (Basic commands like Draw, modify). 1.8 Advantages of CAD, 1.9.Geometrical constructions	**06**	**10**
CCF109-2Produce the projection of point, lines& planes inclined to one reference plane			
2	**Projection Of Point And Lines** 2.1 Projection of points when point is in first quadrant Only 2.2 Projection of Line inclined to one Reference plane and Parallel to other Reference Plane (Both ends of line should be in first quadrant)	**04**	**06**
CCF109-2Produce the projection of point, lines& planes inclined to one reference plane.			
3	**Projection Of Planes** 3.1 Projection of Planes of Circular , Square, Triangular,Rectangular , Pentagonal , Hexagonal Shapes Inclined To One Reference Plane And perpendicular to other Reference Plane. (Planes in First Quadrant Only)	**06**	**06**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF109-3Produce orthographic drawing from given pictorial view.		
4	Orthographic Projection 4.1 Introduction of Orthographic Projection-First and Third angle Projection Method 4.2 Conversion of Pictorial view into Orthographic Views. (First angle Projection Method Only) 4.3 Dimensioning Technique as per SP-46	**06**	**16**
	CCF109-4 Produce sectional orthographic drawing from given pictorial view.		
5	**Sectional Views.** 5.1 Types of sections 5.2 Conversion of pictorial view into sectional Orthographic views. (First Angle Projection Method only)	**04**	
	CCF109-5Visualize & draw accordingly the pictorial view by correlating the given views.		
6	**Isometric Projection** 6.1 Introduction 6.2 Isometric Axis 6.3 Isometric scale 6.4 Drawing of Isometric view and Projection. 6.5 Conversion of Orthographic Views into Isometric view/projection(Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)	**06**	**12**
	Total	**32**	**50**
Semester end Practical 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 Practical examination :

Topic No.	Name of topic	Distribution of marks			Total marks
		Knowledge	Comprehension	Application	
1	Introduction To Engineering Drawing	04	02	04	10
2	Projection of Point And Lines	02	02	02	06
3	Projection of Planes	02	02	02	06
4	Orthographic projection	04	04	08	16
5	Sectional Views.				
6	Isometric Projection	04	02	06	12
	TOTAL	16	12	22	50

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.

Practical:

List of Practical:

Sr No.	**Title of Practical Exercise**	**Skills / Competencies to be developed**	**Course Outcome**
1	Geometrical Constructions Using CAD (1 Sheet)	To develop drawing skill	CCF109-1
2	Projections of line (1 Sheet)	To develop drawing ability in Projections of line	CCF109-2
3	Projections of Planes (1 Sheet)	To develop drawing ability in Projections of Planes	CCF109-2
4	Orthographic projection(1 Sheet)	To develop drawing ability to draw Orthographic projection	CCF109-3
5	Sectional Views. (1 Sheet)	To develop drawing ability in sectional views	CCF109-4
6	Isometric Projection (2 Sheet) Isometric views of two objects – 1 sheet Isometric Projections of two objects – 1 sheet	To develop ability to draw Isometric projection	CCF109-5

ASSESSMENT CRITERIA FOR TERM WORK

a)Continuous Assessment of Drawing Practical

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

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

One mid-term ***Progressive Skill*** *Test* of **50** marks shall be conducted as per criteria given below:

Sr No.	Criteria	Marks allotted
1	Correctness and understanding	20
2	Line work and neatness	10
3	Dimensioning and judgment without measurement	10
4	Proper use of instrument	10
	Total	50

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

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, B.C.Rana	Engineering Drawing	Pearson, 2010
5.	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age Publication, Reprint 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)http://www.teachengineering.org/view_activity

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

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COURSE ID :

Course Name : WORKSHOP PRACTICES (ET)
Course Code : CCF114
Course abreviation : FWSD

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	Nil	02
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Oral 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	Nil	--	-	50	--	50

RATIONALE:

Workshop practices mainly deals with various trades such as Wood working, Fitting and Sheet metal. 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, fitting and sheet metal trade.

Cognitive : Understand different types of tools in wood working, sheet metal and fitting trade.

Psychomotor : Prepare a simple job using wood working, fitting and sheet metal trade.

Affective : Develop **a**ttitude of i) Interpret drawing ii) Safety

COURSE OUTCOMES :

CCF 114-1 Select different types of wood material.
CCF 114-2 Select different types of tools used in workshop.
CCF 114-3 Preparing simple components in workshop.
CCF 114-4 Interpret drawing.
CCF 114-5 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 **]**

Competency and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency:	1	-	3	-	-	-	-	3	-	-	2	-
CCF114-1	1	-	3	-	-	-	-	3	-	-	2	-
CCF114-2	1	-	3	-	-	-	-	3	-	-	2	-
CCF114-3	1	-	3	-	-	-	-	3	-	-	2	-
CCF114-4	1	-	3	-	-	-	-	3	-	-	2	-
CCF114-5	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** :- a)Any one composite job from the following involving different operations, joints, turning & planning, surface finishing by emery paper, varnishing etc. i)Switch board. ii)Computer table. iii)Printer Table	10/18	a)Study of carpentry tools, Identifying materials b)Measuring dimensions c)Interpretation of drawing d) Operating on planning, cutting, drilling machines e) Time management and observing safety habits f)Prepare furniture or article with carpentry joints	CCF1 to CCF 5
2	**FITTING** a) Demonstrations of different fitting tools & drilling machine and power tools b)Demonstrations of different operations like marking, filing, cutting, drilling and tapping c)One simple fitting job (male female assembly type) involving practice of filing drilling cutting tapping etc.	12/16	a)Studying fitting tools, Identifying materials b)Measuring dimensions c)Interpretation of drawing d)Operating drill, saw machines e) Time management and observing safety habits	CCF 2 to CCF 5
3	**Sheet Metal shop**: a) Demonstrations of different sheet metal tools & Machines b) Demonstrations of different sheet metal operations like sheet cutting, bending, edging, end cutting, Lancing, soldering, riveting. c) To select proper sheet gauge and types of G.I. Sheet required for the job d) One simple job involving sheet metal operations, soldering and riveting e) One composite job from the following 1)Dustbin 2) Letter box 3) Grain container	**10/16**	a)Studying 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 f) Prepare utility article	CCF2 to CCF 5

	4)Bucket 5) Tray 6) Trunk 7) Tin box Batch size should be selected depending volume of work			

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 :

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

Domain	Particulars	Marks out of 50
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	10
	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 :-

Demonstration during Practicals
Workshop Record Book, maintenance record book.
Workshop Journal.

Teaching and learning resources:-

Shop Demonstration
Hands on training on machine

Reference Books :-

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

Websites:

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

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	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	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 socio-economical 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 Apply concentration skills in various tasks.
CCF201-2 Apply learning skills to gain new knowledge,skills and techniques.
CCF201-3 Make use of language skills for effective interaction.
CCF201-4 Organize studying skills,self motivation for best performance.
CCF201-5 Adapt behavioral and aesthetic skills.
CCF201-6 Adapt creativity skills for doing work creatively.

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 and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Apply generic skills to learn to achieve refinement in overall development of personality as follows:	-	-	-	-	**1**	-	1	-	1	1	1	1
CCF201- Apply concentration skills in various tasks.	-	-	-	-	**1**	-	1	-	1	1	1	1
CCF201-2 Apply learning skills to gain new knowledge,skills and techniques.	-	-	-	-	**2**	1	-	-	-	1	-	-
CCF201-3 Make use of language skills for effective interaction.	-	-	-	-	**-**	1	-	-	-	2	1	1
CCF201-4 Organize studying skills,self motivation for best performance.	-	-	-	-	**1**	-	1	-	2	-	1	-
CCF201-5 Adapt behavioral and aesthetic skills.	-	-	-	-	**-**	-	1	-	-	1	1	1
CCF201-6 Adapt creativity skills for doing work creatively.	-	-	-	-	**2**	-	1	-	1	2	1	1

CONTENT:

THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	CCF201-1 Apply concentration skills in various tasks.	
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	**02**
	CCF201-2 Apply learning skills to gain new knowledge,skills and techniques.	
2	**Concentration Skills** 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. 2.3 Concentration skills : Breathing exercises and *pranayam* 2.4 Concentration skills : Chanting *omkar* 2.5 Concentration skills : Prayer - Daily input of positive Thoughts 2.6 Concentration skills : Meditation	**06**
	CCF201-3 Make use of language skills for effective interaction. ***CCF201-4 Organize studying skills,self motivation for best performance.***	
3	**Learning Skills** **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 LearningSkills:**Skillsof observing, listening, reading, notes taking, memorizing, problem solving, graphic,experimenting, surveying, calculating skills, Cognitive skills. **3.4 Studying skills :**Planning and scheduling, Methods ofstudy as per natureof 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	**08**

	CCF201-3 Make use of language skills for effective interaction.	
4	**Language Skills** 4.1 Vocabulary. Pronunciation. Spellings. Recitation. 4.2 Listening and recitation. 4.3Word games.	**06**
	CCF201-5 Adapt behavioral and aesthetic skills.	
5	**Aesthetic Skills** 5.1 Sense of aesthetics. Appearance. Neatness. Decency. Sense of colours and graphics 5.2 Application of aesthetics in appearance, work, note book and paper writing, submission work	**02**
	CCF201-5 Adapt behavioral and aesthetic skills.	
6	**Behavioral Skills** 6.1Manners and etiquettes. Discipline. Sincerity. Morales. Politeness. Social and civic sense. Assertion without aggression.	**04**
	CCF201-6 Adapt creativity skills for doing work creatively.	
7	**Creativity Skills** 7.1 Meaning and importance of creativity. 7.2 Doing things creatively.	**04**
	TOTAL	**32**

B. TERM WORK
(Minimum Eight From List)

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	Pronunciation, language acquaintance	CCF201-3 & 4

	Exercise		
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	Topic
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

g) Term work :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Understanding	02
	Application	02
Psychomotor	Presentation Skills	04
	Drafting skills	05
Affective	Discipline and punctuality	06
	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 Generic Skills*

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

h) 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	Learnin g 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 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.	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 Manners	Pustak Mahal, New Delhi
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*

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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	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
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 Proforma II.	
Marks	**10**	**--**	**40**	**25**	**--**	**75**

* *Practical Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher ofdifferent classfrom 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	**PO 2 Discipline knowledge**	**PO 3 Experiments and practice**	**PO 4 Engineering Tools**	**PO 5 The engineer and society**	**PO 6 Environment and sustainability**	**PO 7 Ethics**	**PO 8 Individual and team work:**	**PO 9 Communication**	**PO 10 Life-long learning**	**PSO1 Operate and Maintain**	**PSO2 Supervision and Providing Solution**
Competency Apply principles of communication to communicate in formal and informal scenario	-	-	-	-	1	-	-	2	3	1	1	1
CCF202-1 Identify his/her communication barrier	-	-	-	-	1	-	-	1	2	-	-	1
CCF202-2 converse and convince by speaking, deliver prepared & extempore speech	-	-	-	-	2	-	1	2	3	1	-	-
CCF202- 3write letters, reports, resume in correct language	-	-	-	-	1	-	1	2	2	1	-	1
CCF202-4 Make effective use of body language & graphic communication	-	-	-	-	1	-	2	2	2	1	1	1
CCF202-5 Prepare and present simple media aided presentation	-	-	-	-	1	-	-	-	2	1	1	-
CCF202-6 Prepare and face mock interview	-	-	-	-	-	-	1	-	2	-	-	-

CONTENT:

THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCF202-1 Identify his/her communication barriers		
1	**Fundamentals of Communication** 1.1 Definition of communication by Newman and Peter Little. Importance communication 1.2 Modelof 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	**08**	**12**
	CCF202-2 Converse and convince by speaking, deliver prepared & extempore speech		
2	**Oral Communication** 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	**06**	**06**
	CCF202-3 Write letters, reports, resume in correct language		
3	**Written Communication** 3.1 Principles and characteristics of written communication. 3.2 Writing reports, letters, resume and notes.	**06**	**06**
	CCF202-4 Make effective use of body language & graphic communication		
4	**Non-verbal communication** 4.1 Principles and characteristics of non-verbal Communication. 4.2 BodyLanguage:visual, tactile, auditory, cultural. Silence. 4.3 GraphicCommunication: Visual illustration, technical graphic communication.	**04**	**06**

	CCF202-5Prepare and present simple media aided presentation		
5	**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 PowerPoint,LCD, board, charts	**04**	**06**
	CCF202-6Prepare and face mock interview		
6	**Interview Techniques** 6.1 Preparing for an interview 6.2 Taking a mock interview and facing an interview	**04**	**04**
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
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.

C. 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 Communication Process	Analysis of communication process	CCF202-1
2.	My Communication Barriers	Self analysis	CCF202-1

3.	Verbal Communication : Vocabulary	Improvement in vocabulary	CCF202-2 &3
4.	Oral Communication : Prepared Speech	Preparing and delivery	CCF202-2
5.	Oral Communication : Extempore Speech	Creative thinking and speaking	CCF202-2
6.	Oral Communication : Conversation	Listening, thinking and speaking	CCF202-2
7.	Oral Communication : Group Discussion	Listening, thinking and convincing	CCF202-2
8.	Oral Communication : Group Debate	Listening, thinking and convincing	CCF202-2
9.	Written Communication : Drafting Skills	Drafting	CCF202-3
10.	Written Communication : Writing formal and Informal Letters	Drafting	CCF202-3
11.	Written Communication : Writing Reports	Drafting with comprehension	CCF202-3
12.	Written Communication : Writing Scripts	Drafting	CCF202-3
13.	Non-verbal Communication : Graphic Communication	Graphic skills	CCF202-4
14.	Non-verbal Communication : Body Language	Body language	CCF202-4
15.	Using Presentation Aids	Using presentation aids	CCF202-5
16.	Interview Techniques	Facing interview	CCF202-6

D. INDUSTRIAL EXPOSURE:

(Included in*Workbook on Communication Skills*)

SN	Mode of Exposure	Topic
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

i) 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
Cognitive	Understanding	02
	Application	02
Psychomotor	Presentation Skills	04
	Drafting skills	05
Affective	Discipline and punctuality	06
	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.*

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

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COURSE ID:

Course Name : PROFESSIONAL PRACTICES
Course Code : CCF203
Course Abbreviation : FPRP

TEACHING AND EVALUATION SCHEME:

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

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	01	03
Practical	02	

Evaluation Scheme:

Mode of Evaluation	**Progressive Assessment**		**Term End**			**Total**
	Theory	**Practical**	**Theory**	**TW**	**OR***	
Detailsof Evaluation	--	One mid-term skill test(2 hrs)	No Term End Theory Exam	As per proforma V	Oral Exam	
Marks	---	--	--	25	50I	75

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

RATIONALE:

The course *Professional Skills* is in continuation of the courses *Generic Skills* and *Communication Skills* studied in semesterI 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 skill as follows:

Cognitive : Understanding and applying principles of professional practices 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 :

CCF203-1 Develop awareness about industrial scenario of world and India

CCF203-2 Acquire professional skills like leadership, stress and conflict management, team building skills

CCF203-3 Identify major technological project in program discipline.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency Apply principles of organizational behavioral science for professional skill as follows:	-	-	-	-	2	-	1	1	2	1		
CCF203 -1	-	-	-	-	2	1	-	-	2	1		
CCF203 -2	-	-	-	-	2	-	2	2	3	1		
CCF203 -3	-	1	-	-	2	-	1	1	2	1		

CONTENT:

A) THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	CCF203-1 Develop awareness about industrial scenario of world and India	
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**
	CCF203-2 Acquire professional skills like leadership, stress and conflict management, team building skills	
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**
	CCF203-3 Identify majo technological project in program discipline	
3	**Industrial Personalities and Major Projects** 1.1 Pioneers of Industrial development of India : Brief biography of Sir M. Visvesarrya and JRD Tata 1.2 Biography and contribution of two great industrial personalities from programme discipline 1.3 Study of 5 major technological projects in the programme discipline	**06**
	Total	**16**

B) 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 / Competncies to be developed	COURSE OUTCOMES
1.	Information Search through internet on Industrial Scenario of India	Information search and interpretation skills	CCF203-1
2.	Information Search through actual visit to MIDCs on classification of industries	Information search and interpretation skills	CCF203
3.	Biography and contribution of Sir M. Visverayya and J.R.D.Tata	Information search and presentation skills	CCF203-3
4.	Biography and contribution of two eminent industrialists from programme discipline	Information search and presentation skills	CCF203-3
5.	Individual SWOT analysis as a professional technician	Self-analysis skills	CCF203-2
6.	Leadereship	Leadership skills	CCF203-2
7.	Stress and Conflict Management	Stress and conflict management skills	CCF203-2
8.	Aptitude test	Self-testing skills	CCF203-2
9.	Case study of a major technological project in the programme discipline	Case study skills	CCF203-1,2,3
10.	Breathing exercises, pranayam, omkar chanting and meditation	Attaining calmness of mind and balance of emotions	CCF203-2

C. INDUSTRIAL EXPOSURE :
(Included inthe contents of*Theory* and *Term work*)

SN	Mode of Exposure	Topic
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

a) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments:

Everypractical 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 termwork shall be awarded as per *Assessment Pro-forma V*

b) **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*
ii) www.mindtools.com

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LEVEL –III

BASIC TECHNOLOGY COURSES

COURSE ID:

Course Name : APPLIED MATHEMATICS
Course Code :EIF 301
Course Abbreviation :FAMT

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	03	04
Tutorial	01	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
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)	NIL	NIL	
Marks	**20**	**----**	**80**	NIL	NIL	**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. 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,
   To understand concept of complex numbers and hyperbolic functions
3. Attitude: discipline, consistency, hard work , to concentrate ,accuracy, punctuality, aesthetics

Course Outcomes(CO's)

EIF 301-1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values

EIF 301-2 Solve Differential equation of first order and first degree by various methods and use it to solve various geometrical problems and application to rate and motion of a particle

EIF 301-3 Understand and solve examples of complex numbers and hyperbolic functions

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 and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency:	2	-	1	-	-	-	-	-	-	-	-	3
EIF 301-1	2	-	1	-	-	-	-	-	-	-	2	2
EIF 301-2	2	-	1	-	-	-	-	-	-	-	2	1
EIF 301-3	2	-	1	-	-	-	-	-	-	-	1	1

CONTENT :

C) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF 301-1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values		
1	Indefinite Integrals Definition, Standard formulae 1.1 Rules of Integration(without proof), Examples 1.2 Integration by substitution, 1.3 Integration by parts, 1.4 Integration by partial fractions	**12**	**20**
	EIF 301-1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values		
2	Definite Integrals 2.1 Definition, Examples 2.2 Properties of Definite Integration (without proof), Examples based on properties	**06**	**10**
	EIF 301-1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values		
3	Application of Integration 3.1 Area under the curve and 3.2 Area between two curves 3.3 Mean value & R.M.S. value of a function	**06**	**10**
	Total	**24**	**40**

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)
EIF 301-2 Solve Differential equation of first order and first degree by various methods			
4	Differential equations 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	**08**	**16**
EIF 301-2 Solve Differential equation of first order and first degree by various methods and use it to solve various geometrical problems and application to rate and motion of a particle			
5	Applications of Differential Equations 5.1 Geometrical application-To find equation of curve 5.2Application to rates-Displacement,velocity and acceleration of a moving particle	**04**	**04**
EIF 301-3 To understand and solve examples of complex numbers and hyperbolic functions			
6	Complex numbers 6.1 Definition , Algebra of complex numbers , simple examples 6.2 Argand diagram , Polar form ;Exponential form; 6.3 De-Moivre's Theorem, Roots of a complex number 6.4 Euler's Theorem 6.5 Hyperbolic functions ,Relation between trigonometric function and hyperbolic function 6.6 separation into real and imaginary parts	**12**	**20**
	Total	**24**	**40**

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 No.	Name of topic	Distribution of marks (level wise)			Course Outcome	Total Marks
		Remember	Comprehension	Application		
1	Indefinite Integrals	4	6	10		20
2	Definite Integrals	2	2	6		10
3	Application of Integration	--	--	10		10
4	Differential equations	2	4	10		16
5	Application of diff.equations	--	--	04		04
6	Complex Numbers	4	4	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.

D) TUTORIALS

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

Sr No.	Topic	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	Aplication of D.E.	Examples on Rates and geometrical applications
9	Complx numbers(1)	Examples of complex numbers
10	Complx numbers(2) Hyperbolic functions	Examples of hyperbolic functions

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures and Demonstrations
2. Tutorials

Teaching and Learning resources:

1. Chalk board 2. Item Bank 3.Charts

REFERENCE MATERIAL :

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

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COURSE ID:

Course Name : APPLIED ELECTRONICS
Course Code :EIF 302
Course Abbreviation : FATX

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIF 103 Basic Electronics

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
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)	Pro-forma VI	*Practical (3 hours)	
Marks	**20**	**----**	**80**	**25**	**50E**	**175**

E-External Assessment * Assessment as per Pro-forma IV & VI

RATIONALE:

Recent advances in electronics have revolutionized the traditional approach to electronic Circuitry. Numbers of modern devices are being continuously introduced and used as components in the Circuitry. The contents of this subject are in continuation of contents of Basic Electronics. It introduces more specialized devices and circuits, their characteristics and functions. It also discusses more examples of the basic processes of an electronic circuit.

COMPETENCY:

Apply and build simple electronics circuits in real time.

Cognitive: Understand applications of electronic circuits.

Psychomotor: .Build circuits as per application

Affective: Attitude of i) Logic ii) accuracy

COURSE OUTCOMES:

EIF302-1.Select type of feedback amplifier as per requirement in industry.
EIF302-2. Identify various sinusoidal oscillators and generate sine wave of fixed frequency required in communication system.
EIF302-3.Analyze various power amplifiers and choose particular power amplifier as per requirement.
EIF302-4 Analyze transistor behavior as a switch and use it's switching property in multivibrator applications..
EIF302-5.Use sweep generators in electronics circuits.
EIF302-6 Assemble different wave shaping circuits and change input waveform shape as per requirement
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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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Apply and build simple electronics circuits in real time	-	2	2	-		-	-	1	-	-	2	-
EIF302-1	1	2	2	-	-	-	-	1	-	-	-	-
EIF302-2	1	2	2	-	-	-	-	1	-	-	-	-
EIF302-3	-	2	2	-	-	-	-	1	-	-	3	-
EIF302-4	1	2	2	-	-	-	-	1	-	-	-	-
EIF302-5	-	2	2	-	-	-	-	1	-	-	3	-
EIF302-6	-	2	3	-	-	-	-	1	-	-	3	-

CONTENTS :

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF302-1. Select type of feedback amplifier as per requirement in industry			
1	**Feedback Amplifier** **Concept of feedback** 1.1 Negative and positive feedback 1.2 Advantages of negative feedback 1.3 Effect of negative feedback on amplifier characteristics 1.4 Types of negative feedback (Only block diagram,comparision) a) Current series feedback b) Voltage series feedback c) Voltage shunt feedback d) Current shunt feedback e) Darlington pair , Darlington amplifier (only introduction) f) Principle of Bootstrapping g) Numericals problems based on feedback formula.	07	12
EIF302-2 Identify various sinusoidal oscillators and generate sine wave of fixed frequency required in communication system			
2.	**Sinusoidal Oscillators** 2.1Positive feedback in oscillators 2.2 Barkhausen's Criteria 2.3Circuit Diagram, Working, frequency formula of following oscillators:- 2.3.1 Tuned circuit Oscillators 2.3.2 Hartley Oscillator 2.3.3 Colpitts oscillator . 2.3.4 RC phase-shift oscillator, 2.3.5 Wein Bridge oscillator 2.3.6 Crystal oscillator 2.4 Frequency stability consideration 2.5 Numericals based on oscillator frequency formulae	07	12
EIF302-3..Analyze various power amplifiers and choose particular power amplifier as per requirement			
3	**Power and Tuned Amplifier** 3.1 Classification of Power Amplifier 3.2 Circuit Diagram, Working, Characteristics,	10	16

	Efficiency of following: 3.2.1 Class A Power Amplifier - Transformer coupled P A. 3.2.2 Class B Power Amplifier and Crossover distortion 3.2.3 Class B Push pull amplifier 3.2.4 Complementary symmetry Class B Push Pull amplifier 3.2.Class C amplifier(only introduction) 3.3 Tuned Amplifiers 3.3.1 Series and parallel connections of tank circuit 3.3.2 Frequency response of tuned amplifier 3.3.3 Single tuned amplifier 3.3.4 Double tuned amplifier		
	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.			

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF302-4 Analyze transistor behavior as a switch and use it's switching property in multivibrator applications.			
4	**BJT Switching Circuits** 4.1 Transistor as a switch, Transistor Switching Times 4.2 Transistorized Multivibrators and its types:- Circuit Diagram, Operation, timing equations & applications of following:- 4.2.1 Astable multivibrator 4.2.2 Monostable multivibrator 4.2.3 Bistable Multivibrator 4.2.4 Schmitt Trigger 4.3 Numericals problems based on timing equations	08	14
EIF302-5. Use sweep generators in electronics circuits..			
5	**Sweep Generators** 5. 1 Voltage timebase generator 5.1.1 Exponential sweep circuit 5.1.2 Transistor switch sweep generator 5.1.3 UJT switch sweep generator 5.1.4 Miller sweep generator 5.1.5 Bootstrap sweep generator 5.2 Current sweep generator -Transistorized	08	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	constant current sweep generator		
EIF302-6 Assemble different wave shaping circuits and change input waveform shape as per requirement			
6	**Wave shaping Circuits** Circuit diagram, waveforms and operation of following:- 6.1 Linear wave shaping circuits. 6.1.1 Differentiator - High pass R--C circuits -Response to triangular input & square wave 6.1.2 Integrator-- Low pass RC circuit – Response to square input & rectangular input 6.2Nonlinear wave shaping 6.2.1 Clippers 6.2.1.1Positive clipper 6.2.1.2 Negative clipper 6.2.1.3 Combinational clipper 6.2.2 Clampers 6.2.2.1 Positive clampers 6.2.2.2 Negative clampers 6.2.2.3Voltage doublers and triplers.	08	12
	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.			

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

Sr. No.	Name of the Topic	Distribution Of Marks (Cognitive Level- wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1.	Feedback Amplifiers	04	04	04	EIF302-1	12
2	Sinusoidal Oscillators	04	04	04	EIF 302-2	12
3	Power Amplifiers & tuned amplifiers	06	06	04	EIF 302-3	16
4	BJT switching circuits	04	04	06	EIF 302-4	14
5	Sweep Generators	04	04	06	EIF 302-5	14
6	Wave shaping Circuits	04	04	04	EIF 302-6	12
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.

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 forApplied Electronics* 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.	Clipping circuit waveform observation.	1) To observe Clipping waveform on CRO	EIF 302-6
2.	Astable multivibrator using transistor : time measurement and calculations.	1) To generate square wave form on CRO 2) To measure time period on CRO and verify it by using calculation formula	EIF 302-4
3.	Monostable multivibrator using transistor : time measurement and calculations	1)To measure time period on CRO and verify it by using calculation formula	EIF 302-4
4.	Bistable multivibrator using transistor	1) To check transistor switching action.	EIF 302-4
5.	Schmitt trigger using transistor	1) To check how the input waveform is converted in to the square wave	EIF 302-4
6.	Any type of LC oscillator using BJT: frequency calculation.	1) Calculate the oscillator frequency	EIF 302-2
7.	Any type of RC	1) Calculate the oscillator frequency	EIF 302-2

	oscillator: frequency calculation.		
8.	Study of differentiator	a)To study RC circuit as an differentiator b) To check applications of differentiator as waveshaping circuit(response of the circuit for square and triangular input)	EIF 302-6
9.	Study of voltage double	1) To study how the output voltage gets doubled the input voltage.	EIF 302-6
10.	Study of Clamping circuit :waveform observation	1)Observe Clamping waveform on CRO	EIF 302-6
11.	Study of integrator	a)To study RC circuit as an integrator b)To check applications of integrator as waveshaping circuit(response of the circuit for square input)	EIF 302-6
12.	Mini Project(Compulsory)	Build any circuit on general PCB in a group of 3 students	-

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

k) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**25**

ii) Progressive Skill Test :

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

l) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 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

Assessment at semester end practical exam as per Pro-forma I.

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

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Applied electronics	R.S.Sedha	S. Chand and Co.
2.	Electronics principles	A.P.Malvino	Tata McGraw-Hill
3	Applied electronics	G.K.Mithal	Khanna
4	Basic electronics	B.L.Theraja	S. Chand and Co.
5	Principles Of Electronics	V.K.Mehata	S. Chand and Co.

b) Websites:

1) http://www.electronics-tutorials.ws/

2) www.nptel.ac.in

*** * ***

COURSE ID:

Course Name :Electronics Measurements and Instruments
Course Code :EIF 303
Course Abbreviation :FEMI

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
Details of Evaluation	Average of two tests of 20 marks each	iii. 25 marks for each practical iv. One PST of 25 marks	Term End Theory Exam (03 hours)	As per proformaII	Internal Oral Exam	
Marks	**20**	**--**	**80**		**25I**	**125**

I-External Assessment * Assessment as per Pro-forma II

RATIONALE :

This subject intends to provide the students practical information & technical background. It also provides the students with concepts, principles and procedures of Analog and Digital electronic measuring instruments and the measurement techniques for the measurement of various electronic quantities. Because of the scope of the subject, students are well exposed to a good and wide area of the various electronic measuring instruments as the subject comprises of those basic equipment of which students should have knowledge.

This subject presumes that the students are familiar with basic utilization of measuring instruments. The era of this subject consists of the information about concepts, principles and Procedures of analog and digital electronic measuring instruments and measuring techniques.

COMPETENCY:

Illustrate practical information & technical background for different engineering applications.
Cognitive: Differentiate different types of measuring instruments.
Psychomotor: Calibrate different types of measuring instrument.
Affective: Attitude of i) accuracy ii) precision iii) punctuality iv) knowledge.

COURSE OUTCOMES :

EIF303-1 Describe various characteristics of measuring instruments.
EIF303-2 Identify unknown values of components using bridges for industrial applications.
EIF303-3 Describe & suggest suitable digital instruments for measurement of various electronic parameters.
EIF303-4 Explain & demonstrate the use of CRO.
EIF303-5 Explain & demonstrate various test & recording 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Illustrate practical information & technical background for different engineering applications	2	1	1	-	-	-	-	1	-	-	3	3
EIF303-1	2	-	1	-	-	-	-	1	-	-	2	1
EIF303-2	2	-	1	-	-	-	-	1	-	-	2	1
EIF303-3	2	-	1	-	-	-	-	1	-	-	3	2
EIF303-4	2	-	1	-	-	-	-	1	-	-	3	3
EIF303-5	-	2	1	-	-	-	-	1	-	-	3	3
EIF303-6	-	2	1	-	-	-	-	1	-	-	3	3

CONTENT :

A) THEORY

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF303-1 Describe various characteristics of measuring instruments.			
1	**Basics of Measurement** 1.1 Classification of Instruments: Absolute , Secondary Instruments 1.2 Definitions of Static characteristics of Instruments: Accuracy, Precision, Sensitivity, Resolution, Static error, Reproducibility, Drift, Dead Zone 1.3 Definitions of dynamic characteristics of Instruments: Speed of response, Lag, fidelity, Dynamic error 1.4 Types of Errors- Gross, Systemic, Random 1.5 Units of measurement of fundamental quantity 1.6 Definition of Standards and their classification: International, Primary, Secondary. 1.7 Calibration: Definition, Need of calibration	06	08
EIF303-2 Identify unknown values of components using bridges for industrial applications.			
2.	**Ac/Dc Bridges & Their Applications** 2.1 Bridge balance condition for DC bridge 2.2 Study of following Dc bridges : 2.2.1 Whetstone's bridge 2.2.2 Guarded whetstone's bridge. 2.2.3 Kelvin's bridge 2.3 Bridge balance condition for AC bridge 2.4 Study of following AC bridges. 2.4.1 Capacitance comparison bridge 2.4.2 Inductance comparison bridge 2.4.3 Maxwell's bridge. 2.4.4 Hay bridge 2.4.5 Schering's bridge 2.4.6 Wien's bridge. 2.5 Wagner ground connection	09	16
EIF303-3 Describe & suggest suitable digital instruments for measurement of various electronic parameters.			
3	**Digital Meters**: 3.1Concepts of ADC & DAC only 3.2 Advantages and Disadvantages of Digital Instruments and comparison with analog instruments 3.3 Definition of Average & RMS value. 3.4 PMMC- Working Principle, Construction, Sources	09	16

	of torque. 3.5 Resolution, Sensitivity and Accuracy of digital display. 3.6 Digital Voltmeter-Ramp type DVM, Integrating type DVM, Successive approximation type DVM, Dual slope type DVM. (Block diagram, Operation and waveform if required). 3.7 Digital Multi-meter- Concept of 3. - 1/2 digit 3.8 Digital frequency meter 3.8.1 Basic block diagram of digital frequency meter 3.8.2 Basic block diagram for measurement of Frequency Showing Gate control Flip-Flop. 3.8.3 Time period measurement. 3.8.4 ratio measurement 3.9LCR, Q meter- Block diagram and operation only		
	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.			

Section II

Sr. No.	**Topics / Sub-topics**	**Lectures (Hours)**	**Theory Evaluation (Marks)**
EIF303-4 Explain & demonstrate the use of CRO.			
4	**Oscilloscope** 4.1 Oscilloscope subsystems- 4.1.1 Display subsystems- CRT, Deflection of electron beam in CRT, Electrostatic and Electromagnetic deflection, sensitivity. 4.1.2 Vertical deflection subsystems- Input Coupling selector, Input attenuator, Pre-amplifier, Main vertical amplifier, delay line. 4.1.3 Horizontal deflection subsystems- Trigger circuit, Time base generator, Main Horizontal amplifier. 4.1.4 CRO Probes- General block diagram of CRO probe, passive voltage probe, and their compensation, Active Voltage probes, current probes. 4.1.5 Calibration circuits. 4.2 CRO-Block diagram of single beam dual trace and dual beam oscilloscope. 4.3 Block diagram of Digital storage oscilloscope. Uses of CRO- Frequency and phase measurement, Tracing of diode and transistor characteristics	12	20

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF303-5 Explain & demonstrate various test & recording instruments		
5	**Signal Generator and Analyzer** 5.1 Concept of oscillator. 5.2 Signal generator-AF and RF type- Block diagram and Operation only. 5.3 Function generator and pulse generator- Block diagram,Simple controls and operation only. 5.4 Specification. 5.5 Concept of time domain and frequency domain Instruments. 5.6 Spectrum & Logic analyzer- Block diagram and Operation only.	08	12
	EIF303-5 Explain & demonstrate various test & recording instruments		
6	**Recorders** 6.1 Classification of recorders and necessity of Recorders. 6.2 Strip chart recorder 6.2.1 Block diagram of strip chart recorder and Function of each block. 6.2.2 Application 6.3 X - Y recorder 6.3.1 Block diagram of X - Y recorder and function of each block 6.3.2 Application 6.4 Circular chart recorder 6.5 Features of recorders.	04	08
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Basics of Measurement:	04	02	02	EIF303-1	08
2	AC/DC bridges & applications	04	04	08	EIF303-2	16
3	Digital Meters	04	04	08	EIF303-3	16
4	Oscilloscope	06	06	08	EIF303-4	20
5	Signal generators & analyzers	02	08	02	EIF303-5	12
6	Recorders	02	04	02	EIF303-6	08
TOTAL		22	28	30		80

B) TERM WORK

Practical Exercises and related skills to be developed:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Using analog and digital Multimeter measurement of current, voltage, resistance.	1. Connect power supply 2. Check voltage, current, & resistance using multi-meter.	EIF303-1
2.	Using LCR--Q meter measurement of different values of inductor, Capacitor , resistor component's value	1. start LCR-Q meter in idle mode 2. measure resistor, inductor, & capacitor at different ranges	EIF303-3
3.	Use of CRO as component tester	1. Connect CRO & adjust intensity and focus 2. Test different components like diode, transistor etc. 3. Know front panel of CRO	EIF303-4
4.	Use of CRO for measurement of AC -- DC voltage & frequency	1. Connect CRO & adjust intensity and focus 2. Measure AC, DC voltage 3. Measure time period &frequency	EIF303-4
5.	Use of CRO for measurement of phase & frequency using Lissajous figures	1. Connect CRO & adjust intensity and focus 2. Measure phase difference & frequency ratio using Lissajous figure	EIF303-4
6.	Study of function generator	1. connect function generator 2. Know front panel of function generator 3. Check different output functions using CRO	EIF303-5
7.	Study of detectors for Ac bridge like headphone	1. Connect circuit of AC bridge as per diagram 2. Detect the balancing condition	EIF303-2
8.	Study of whetstone's bridge for measurement of unknown resistance	1. Connect circuit of Wheatstone bridge as per diagram 2. Detect balancing condition 3. Find out unknown resistance	EIF303-2
9.	Measurement of unknown capacitance using bridge	1. Connect circuit of AC bridge as per diagram 2. Detect balancing condition 3. Find out unknown capacitance	EIF303-2
10.	Measurement of unknown inductance using bridge	1. Connect circuit of AC bridge as per diagram 2. Detect balancing condition 3. Find out unknown inductance	EIF303-2
11.	Study of frequency meter	1. Connect frequency mater 2. Know front panel of frequency meter 3. Measure different frequencies of signal	EIF303-3

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

m) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 II.*

n) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 3 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

Assessment at semester end practical exam as per Pro-forma II.

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

REFERENCE MATERIAL :

a) Books

Sr. No.	Author	Title	Publisher
1.	W.D. Cooper	Modern Electronic Instrumentation & Measurement Techniques	Pearson Education,
2.	H.S.Kalsi	Electronic Instruments	Tata Mc Grow Hill
3	A.K. Sawhney	Electrical & Electronic Measurements & Instrumentations	Dhanpat Rai & Co

b) Websites:

1)www.tatamcgrawhill.com

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COURSE ID:

Course Name : C PROGRAMMING
Course Code : EIF304
Course Abbreviation : FCPR

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Practical	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)	One practical (3 Hours) As per Proforma -IV	As per Proforma-VI	
Marks	**NIL**	**25**	**NIL**	**50E**	**25**	**75**

E-External Assessment

RATIONALE:

This course is designed to develop programming attitude and attract the interest of the students in the C Language. Every student in Engineering domain must be able to work on a problem in a procedural way so it is useful to study structured and dynamic language like C.

COMPETENCY:

Develop programming skills for problems in engineering in procedural and modular way in C.

Cognitive: Understanding C programming language fundamentals, constructs and its advanced features.

Psychomotor: Write programs in C for wide range of applications.

Affective: Attitude of i) Logic ii) Accuracy iii) Precision v) Punctuality

COURSE OUTCOMES:

EIF304-1 Identify various program constructs of C program; and make use of these constructs to write C programs
EIF 304-2 Use standard library functions in programming
EIF 304-3 Apply control statements to implement loops and branching for problem solving
EIF 304-4 Adapt modular programming approach
EIF 304-5 Make use of arrays for bulk data and strings handling
EIF 304-6 Illustrate use of structures and pointers in problem solving

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and providing solution
Competency: Develop Programming skills for problems in engineering in procedural and modular way in C	3	1	1	-	-	-	-	-	-	2	1	1
EIF 304-1	3	1	-	-	-	-	-	-	-	2	-	-
EIF 304-2	3	1	-	-	-	-	-	-	-	2	-	-
EIF 304-3	3	1	1	-	-	-	-	-	-	2	-	1
EIF 304-4	3	1	2	-	-	-	-	1	-	2	-	1
EIF 304-5	3	1	2	-	-	-	-	1	-	2	-	1
EIF 304-6	3	1	2	-	-	-	-	1	-	2	-	1

CONTENT:

A) THEORY

Sr. No.	Topics / Sub-topics	Lectures (Hours)
Course Outcome EIF304-1 *Identify various program constructs of C program; and make use of these constructs to write C programs*		
1	**C FUNDAMENTALS** 1.1 History 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	**02**
Course Outcome EIF 304-2 *Use standard library functions in programming*		
2	**OPERATORS & DATA INPUT AND OUTPUT FUNCTIONS** 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()	**04**
Course Outcome EIF 304-3 *Apply control statements to implement loops and branching for problem solving*		
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	**06**
Course Outcome EIF 304-4 *Adapt modular programming approach.*		
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	**05**

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	4.4 Function prototypes 4.5 Recursion	
Course Outcome EIF 304-5 *Make use of arrays for bulk data and strings handling*		
5	**ARRAYS** 5.1 Defining an array, 5.2 One dimensional array ,Declaration and Initialization of Arrays, 5.3 Two Dimensional Arrays Declaration and Initialization of Arrays, 5.4 Passing arrays to a function	**05**
Course Outcome EIF 304-5 *Make use of arrays for bulk data and strings handling*		
6	**CHARACTERS & STRINGS** 6.1 The char data type, using character variables, using string 6.2 Declaring and initializing string variables, 6.3 Reading strings from terminal 6.4 Writing Strings to screen, putting strings together. 6.5 Comparison of two strings 6.6 String- handling Functions	**04**
Course Outcome EIF 304-6 *Illustrate use of structures and pointers in problem solving*		
7	**Structures and Pointers** 7.1 Simple structures (Defining & declaring structures, accessing structure members) 7.2 Complex structures (structures that contain arrays) 7.3 Arrays of structure, Initializing structure, 7.4 Understanding pointers, declaring pointer variable, initialization of pointer variable, accessing address of a variable	**06**

B) TERM WORK

Term work shall consist of the following:

Practical Exercises and related skills to be developed :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
01	Flowchart and Algorithm for programming and introduction to C compiler IDE	1. Writing an Algorithm for a given problem 2. Draw Flowchart from an algorithm 3.	EIF 304-1
02	Format of simple C program and it's elements/C Tokens:	1. State different program elements like- variables, keywords constants, operators, expressions, function calls etc. of given simple C program 2. Demonstrate use of operators	EIF 304-1

	Keywords, Variables, Operators, Constants, Expressions etc	3. Declare variables, symbolic constant 4. Differentiation between identifier and Keyword.	
03	Standard Input and output Functions	1. Use I/O functions scanf(), printf() for inputting and outputting data in a program 2. Include Standard Header file in the program	EIF 304-2
04	Decision making and branching control Statements	1. Use Conditional decision making and branching statements in given problem (if, if-else, if-else-if, switch)	EIF 304-3
05	Switch, break, continue and goto control statements	1. Use switch as an option to if-else-if adder statement 2. Apply switch statement in given problem 3. Demonstrate use of continue and goto statements	EIF 304-3
06	Looping using while, do-while and for control Statements	1. Demonstrate looping and its use 2. Implement looping using control statements 3. Apply looping in given problem	EIF 304-3
07	Arrays	1. Illustrate use of an array 2. Categorize different types of array 3. Declare an array 4. Access a particular element of an array for read and write operation 5. Make use of array in problem solving	EIF 304-5
08	Strings using arrays	1. Declare an array to store strings 2. Read and write strings into an array. 3. Make a use of string related functions: strcat(), strlen(), strcmp(), strcpy() in problem solving.	EIF 304-5
09	User defined unction	1. Illustrate the use of user defined function. 2. Classify types of functions 3. Declare a function 4. Make a use of function in problem solving	EIF 304-4
10	Structures	1. Identify advantage of using structure 2. Define structure and declare and use variables of the structure	EIF 304-6
11	Arrays of Structure	1. State significance of use of array of structure 2. Declare and use structure array variables 3. Accessing members of structure 4. Make use of array of structure in given program	EIF 304-6
12	Pointers	1. Demonstrate the use of pointer 2. Identify difference between variable and pointer 3. Declare a pointer 4. Use pointer to access address of variable in a given problem	EIF 304-6

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.

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:

Domain	Particulars	Marks out of 50
Cognitive	Technical preparedness for practical	05
Psychomotor	Algorithm /Flowchart	05
	Program/Logic	05
Affective	Discipline and punctuality	05
	Decency and presentation	05
TOTAL		**25**

b) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria

Domain	Particulars	Marks out of 50
Cognitive	Technical Ability	05
	Logical Approach	05
Psychomotor	Presentation/ Algorithm and Flowchart	10
	Programming skill	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		**50**

INSTRUCTIONAL STRATEGIES :

Instructional Methods:

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

Teaching and Learning resources:

1. Books
2. Video tutorials
3. Power Point Presentation
4. Self-learning

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1	E. Balgurusamy	Programming in ANSI C	Tata McGraw Hill Education
2	Yashwant Kanetkar	Let us C	BPB Publications
3	Byron Gottfried	Programming with C	Schaum's Outlines Series

a) Websites

1) http://cplus.about.com/od/beginnerctutoriali/a/blctut.htm
2) http://computer.howstuffworks.com/c.htm
3) http://www.indiastudycenter.com/studyguides/sc/objtest/default.asp

*****

COURSE ID :
Course Name : ANALOG COMMUNICATION
Course Code : EIF 305
Course Abbreviation : FACM

TEACHING AND EVALUATION SCHEME
Pre-requisites: NIL

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of evaluation	Progressive Assessment		Semester end		Total
	Theory	Practical	Theory Examination	Term Work	
Details of evaluation	Two tests (1hour each)	iii. 25 marks for each practical iv. One PST of 25 marks*	Term End Theory Exam (03 hours)	As per Proforma-I	
Marks	20 each	25	80	50I	150

*I-Internal Assessment * Assessment as per Pro-forma II.

Rationale:
It is the basic course which is helpful for understanding higher technologies in Radio Communication. Analog Communication is the subject that presents information about the basic philosophies, processes, circuits and other building blocks of communication system.

COMPETENCY:
Explain and Demonstrate, operate and troubleshoot different modulation and demodulation systems.
Cognitive : Understanding the fundamentals of different electronics communication systems and illustrate the function of each block.
Psychomotor : Demonstrate the operation of modulator and demodulator based on various modulating techniques .
Affective : Attitude of i) Logic ii) accuracy iii) soft skills v) punctuality

COURSE OUTCOMES:

EIF305-1 Describe the basic communication systemand calculate the noise at input and output.
EIF305-2 Explain and suggest appropriate modulation technique for given application.
EIF305-3 Identify different circuits in the communication transmitter and receiver.
EIF305-4 Measure and interpret receiver performance characteristics of a given radio receiver.
EIF305-5 Summarize antenna properties and discuss different types of antenna used for various applications.
EIF305-6 Describe the effect of atmospheric layers on electromagnetic wave propagation.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Explain, test different modulation and demodulation systems and demonstrate transmission receiption process.	2	1	2	1	-	-	-	-	-	-	1	1
EIF305-1	1	-	1	-	-	-	-	-	-	-	-	1
EIF305-2	2	-	2	-	-	-	-	-	-	-	-	1
EIF305-3	2	-	1	-	-	-	-	-	-	-	-	-
EIF305-4	1	2	2	-	-	-	-	-	-	1	1	1
EIF305-5	1	2	1	1	-	-	-	-	-	1	-	1
EIF305-6	-	1	-	-	-	-	-	-	-	-	-	1

CONTENT : THEORY : Section I

Ch No	Name of the Topic	Hours	Theory Marks
EIF305-1 Describe the basic communication system and calculate the noise at input and output.			
1	**Introduction to electronic communication system** 1.1 Elements of Basic electronic communication system. 1.2 Classification of electronic communication systems into Wired and Wireless, Uni-cast and Broadcast, simplex, half duplex and full duplex 1.3 Noise Fundamentals, Types, Noise figure, Noise Temperature. 1.4 Electromagnetic Frequency spectrum 1.5 Bandwidth and Information Capacity 1.6 Modulation and Demodulation	06	10
EIF305-2 Explain and suggest appropriate modulation technique for given application.EIF305-3 Identify different circuits in the communication transmitter and receiver.			
2	**Amplitude Modulation And SSB Techniques.** 2.1 Amplitude modulation theory. 2.2 Sidebands, Frequency domain representation and bandwidth of AM wave 2.3 Time domain representation of AM wave and trapezoidal pattern 2.4 Power relation in AM wave. 2.5 Amplitude modulator circuits. 2.6 AM Transmitters – Low level and High level 2.7 Single side band technique (SSB) 2.7. 1 Advantages and disadvantages of SSB 2.7.2 Suppression of carrier. 2.7.3 Suppression unwanted side band. 2.8 Concept of vestigial sideband & waveforms 2.9 Numerical problems based on AM & SSB theory.	10	16
EIF305-2 Explain and suggest appropriate modulation technique for given application.EIF305-3 Identify different circuits in the communication transmitter and receiver.			
3	**Angle Modulation and FM Transmitters** 3.1 Frequency modulation and Phase modulation theory. 3.2 Mathematical representation of FM and PM 3.3 FM and PM waveforms. 3.4 Difference between FM and PM 3.5 Modulation index, Deviation ratio, Bandwidth, Power considerations 3.6 Generation of FM – Direct and Indirect methods 3.7 FM transmitters - Direct and Indirect 3.8 Comparison between AM and Angle modulation 3.9 Numerical problems based on FM and PM theory.	08	14

Section II

Ch. no.	Name of the Topic	Hours	Theory Marks
EIF305-3 Identify different circuits in the communication transmitter and receiver. ***EIF305-4 Measure and interpret receiver performance characteristics of a given radio receiver.***			
4	**Radio Receivers** 4.1 AM Receivers 4.1.1 TRF receivers, Super heterodyne receiver. 4.1.3 Receiver performance characteristics 4.1.4 RF section 4.1.5 Frequency mixer and down converters 4.1.6 Image frequency and its rejection 4.1.7 IF amplifiers 4.1.8 AM detector 4.1.9 AGC circuits. 4.2 FM receivers: 4.2.1 FM discriminators – slope detector, ratio detector, PLL detector 4.2.2 Pre-emphasis and De-emphasis	10	18
EIF305-5 Summarize antenna properties and discuss different types of antenna used for various applications.			
5	**Antennas** 5.1 Radiation Mechanism. 5.2Radiation pattern 5.3Antenna gain, resistance, polarization, beam width, bandwidth 5.4Resonant and non-resonant antennas. 5.5Half wave dipole 5.6Loop antenna. 5.7Helical antenna. 5.8Yagi-Uda antenna. 5.9Parabolic reflector antenna.	06	10
EIF305-6 Describe the effect of atmospheric layers on electromagnetic wave propagation.			
6	**Electromagnetic Wave Propagation** 6.1Electromagnetic waves and polarization 6.2Reflection, refraction, diffraction of waves 6.3Ground (surface) waves propagation. 6.4Space wave propagation. 6.5 Sky wave propagation 6.5.1 Virtual height. 6.5.2 Critical frequency and critical angle 6.5.3 Skip distance. 6.5.4 Maximum usable frequency. 6.6 Fading	08	12

Specification table for setting question paper for semester end theory examination

Ch No	Name Of Topic	**Distribution Of Marks (Cognitive Level Wise)**			Course outcome	Total Marks
		Remember	Understand	Application		
1.	Introduction to electronic communication system	04	06	-	EIF305-1	10
2.	Amplitude modulation and SSB technique.	04	08	04	EIF305-2	16
3.	Angle modulation and FM transmitters	04	06	04	EIF305-3	14
4.	Radio receivers	04	10	04	EIF305-4	18
5.	Antennas	04	06	-	EIF305-5	10
6.	Electromagnetic Wave Propagation	06	06	-	EIF305-6	12
				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 :

Laboratory experiments and related skills to be developed:

Sr. no	**Title of Experiment**	**Skills developed**	**Course outcome**
1	Generation of AM , waveform observation & measurements	Trace the circuit Identify carrier, modulating signal and modulated signal. Observe above waveforms on CRO. Calculate modulating index.	EIF305-2, 3
2	Study trapezoidal pattern	Observe various trapezoidal patterns on CRO. Calculate modulating index using this pattern.	EIF305-2, 3
3	Demodulation of AM using Diode detector	Trace the circuit. Identify modulated and demodulated signal. Observe above waveforms on CRO.	EIF305-2, 3
4	Generation of FM, waveform observation.	Trace the circuit Identify carrier ,modulating signal and modulated signal. Observe above waveforms on CRO. Calculate modulating index.	EIF305-2 , 3
5	Demodulation of FM signal	Observe FM and FM demodulated waveforms on CRO. Observe similarities in modulating signal and demodulated signal.	EIF305-2, 3
6	Visit to Transmitter	Understand AM/FM transmitter and prepare a project report	EIF305-1 - 6
7	Study of super heterodyne radio receiver	Identify different blocks & expected waveforms of super heterodyne radio receiver. Identify different controls and their functions . Observe the waveforms and measure the voltages at different check points.	EIF305-1-5
8	Fault finding in Super heterodyne receiver	Identify different blocks & expected waveforms of superhytodyne radio receiver. Identify different controls and their functions . Locate faults using voltage and waveform technique at different check points and correct them.	EIF305-1-5

9	To plot selectivity curve for superhetrodyne radio receiver	Give input AM wave from signal generator to the circuit and observe output on CRO . Plot the selectivity & fidelity curve by varying carrier frequency.	EIF305-3,4
10	Study of FM Receiver	Identify different blocks & expected waveforms of slope or ratio detector. Identify different controls and their functions available. Observe the waveforms and measure the voltages at different check points.	EIF305-3,4
11	Study and design Of Yagi-Uda Antenna	Draw diagram of yagi_uda antenna. Identify and describe parts of yagi_uda antenna.	EIF305-5
12	Study and design of Parabolic reflector (Dish Antenna)	Draw diagram of Dish antenna. Identify and describe parts of Dish antenna for particular λ.	EIF305-5

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.

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	Attendance at regular practical	05
2	Preparedness for practical	04
3	Correct figures / diagrams	04
4	Observation tables	04
5	Result table / calculations / graphs	04
6	Safety / use of proper tools	04
	Total	25

b) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Presentation	20
2	Conceptual Understanding	20
3	Overall Performance	10
	Total	50

* Assessment as per Pro-forma II

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) Overhead Projector
3) Demonstrative kits.
4) Demonstrative charts.
5) Books:

REFERENCE MATERIAL :

a) Books / Codes:

Sr. No.	Author	Title	Publisher
1.	Wayne Tomasi	Electronic Communication Systems	Pearson Publication
2.	Louis Frenzel	Communication Electronics	TMH Publication
3	Kennedy	Electronic Communication Systems	TMH Publication
4	Roddy Coolen	Electronic Communication	PHI Publication

b)Website :

1. www.nptel.ac.in
2. www.antenna-theory.com

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COURSE ID :

Course Name : DIGITAL TECHNIQUES & APPLICATIONS
Course Code : EIF 306
Course Abbreviation : FDTA

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
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)		*Practical (3 hours)	
Marks	**20**	**--**	**80**	**--**	**50I**	**150**

I-Internal Assessment * Assessment as per Pro-forma II

RATIONALE : The world around us is fast becoming digital. Digital electronics is widely used in computers, Digital communication & digital instrumentation. A grasp of certain fundamental principles and concepts of digital electronics are essential pre-requisites for electronics engineering.

This course aims to provide these crucial inputs to the students so that they are elevated to a proper platform whereon the study of the systems using digital circuits & micro-processor along with their applications become easy and creative to them.

COMPETENCY

Build digital combinational and sequential circuits for different engineering applications.

Cognitive : Acquire knowledge of Digital technics and its different applications.

Psychomotor : Try to design different logic circuits.

Affective : Attitude of i) Logic ii) accuracy iii) control

COURSE OUTCOMES :

EIF 306 -1 Classify different number systems and codes to use it properly in future.
EIF 306-2 Apply the logic and solve the Equations using Boolean laws to provide solution .
EIF 306-3 Analyze different Logic families & working of logic gates to select in solution of problems .
EIF 306-4 Explore combination circuits and ICs for logic design in industry.
EIF 306-5 Explore sequential circuits and ICs for logic design in industry.
EIF 306-6 Classify and characterize the memory & Develop knowledge of different data converters to use them in different circuits 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Build digital combinational and sequential circuits for different engineering applications	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**3**	**2**
EIF 306-1	2	-	-	-	-	-	-	_	-	1	-	-
EIF 306-2	2	-	1	-	-	-	-	1	_	1	-	-
EIF 306--3	1	2	-	-	-	-	-	-	-	1	-	-
EIF 306--4	2	2	3	-	-	-	-	1	-	1	3	3
EIF 306-5	2	3	3	-	-	-	-	1	-	1	3	3
EIF 306-6	2	2	-	-	-	-	-	-	-	1	1	3

CONTENT :

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 306-1. Classify different number systems and codes to use it properly in future.			
1	**Number system & codes** 1.1 Decimal, binary, octal and hexadecimal number systems. 1.2 Decimal to binary and binary to decimal conversion. 1.3 Decimal to octal and octal to decimal conversion. 1.4 Decimal to hex and hex to decimal conversion. 1.5 Binary to hex and hex to binary conversion 1.6 Binary addition 1.7 Binary subtraction using 1's & 2's compliment 1.8 BCD addition &subtraction using 9's and 10's compliment. 1.9 Excess 3 code. 1.10 Gray code and ASCII code	10	12
EIF 306-2 Apply the logic and solve the Equations using Boolean laws to provide solution			
2.	**Boolean Algebras**. 2.1 Boolean Algebra. Fundamentals of Boolean laws 2.2 Basic gates and derived gates(symbols and truth tables) 2.3 Duality Theorem , De Morgan's Theorems.(upto 3 variables) 2.4 Sum of product and product of sum reduction. 2.5Maxterm and Minterm, 2.6 Standard conversion between SOP and POS form 2.7 K – map reduction techniques (upto 4 variables)	10	12
EIF 306-3 Analyze different Logic families & working of logic gates to select in solution of problems.			
3	**Digital Logic Families** a. Study of IC 7400, 7402, 7404, 7408, 7432,7486 (pinout diagram and features) ,equivalent circuits of gates. 3.2 Characteristics of logic families (fan in, fan out, propagation delay, power dissipation, noise margin) 3.3 TTL family: a) Circuit diagram & working of TTL NAND gate 3.4 CMOS family: a) Circuit diagram & working of CMOS inverter b) Circuit diagram & working of CMOS NAND & NOR gates 3.5 ECL family: a) Circuit diagram and working of 3 input	12	16

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 306-1. Classify different number systems and codes to use it properly in future.			
	NOR/OR gate. 3.6 Comparison of logic families. 3.7 Interfacing TTL TTL to CMOS CMOS to TTL		
	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 II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 306-4 Explore combination circuits and ICs for logic design in industry..			
4	**Combinational Logic Circuits** 4.1 Full and half adder 4.2 Full adder using half adders 4.3 Parallel binary adder 4.4 Study of 4 bits binary adder IC 7483 4.5 One digit BCD adder using IC 7483 4.6 Half and full subtractor 4.7 Study of ALU IC 74181 4.8 Encoder , Multiplexer, their uses in combinational Logic design. 4.9 Study of code decoder ,drivers for displays Viz. IC7447 4.10 Study of code converters BCD to binary(IC 74184), Binary to BCD (IC74185),priority encoder(IC 74147). 4.11 Demultiplexers, decoders and their use in combinational logic design. 4.12 Study of IC's 74150 and 74154	14	16
EIF 306-5 Explore sequential circuits and ICs for logic design in industry.			
5	**Sequential Logic Circuits** 5.1 Circuit diagram, truth table and working of S-R flip-flop, J-K, master-slave J-K, D and T flip-flop. 5.2 Race around condition in J--K flip-flop. 5.3 Levels triggered and edge triggered flip-flop. 5.4 Specifications of edge triggered flip--flop. 5.5 SISO,SIPO, PISO & PIPO modes of operation of Shift register. 5.6 Applications of shift registers. 5.7 Bi-directional shift registers. 5.8 Ripple up counter	12	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.9 Ripple down counter 5.10 Ripple UP/DOWN counter. 5.11 MOD 12 ripple counter 5.12 Design of 4 bit synchronous counter using flip-flops. 5.13Study of IC's 7474, 7490, 74193, 74160, 7476, (logic Diagram and truth table only expected.)		
EIF 306-6. Classify and characterize the memory & Develop knowledge of different data converters to use them in different circuits in industry.			
6	Data converters and Memories 6.1 DAC Types – Weighted resistor method and R-2R method 6.2 ADC Types, block diagram and working of Single slope ADC, Study of IC 0801 Dual slope ADC, SAR ADC 6.3 IC PCF 8591 : 8 Bit ADC-DAC 6.4 Memory organization and operation 6.5 Classification of memories 6.5 Characteristics of memories 6.6 RAM- Static, Dynamic and Volatile , Nonvolatile 6.7 ROM – PROM, EPROM, EEPROM 6.8 Study of IC's 2716 and 6116. 6.9 Flash memory	6	10
	Total	**32**	**40**

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Applica--tion		
1	Number systems and codes	4	6	2	EIF 306-1	12
2	Boolean algebra	-	6	6	EIF 306-2	12
3	Digital logic families	4	4	8	EIF 306-3	16
4	Combinational Logic Circuits	4	6	6	EIF 306-4	16
5	Sequential Logic Circuits	4	6	4	EIF 306-5	14
6	Data converters and Memories	6	-	4	EIF 306-6	10
TOTAL		22	28	30	**total**	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 : (Minimum Eight From List)

The following practical exercises shall be conducted :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Study of Logic gates and De Morgan's theorem	1. Test ICs for truthtable. 2. Connect as per circuit and find truthtable.	EIF 306-3
2.	Study of truth table of half adder & full adder using half adder	1. Connect circuit as per diagram 2. Check truth table using multimeter	EIF 306-4
3.	Study of truth table of half subtractor& full subtractor using half subtractor	1. Connect circuit as per diagram 2. Check truth table using multimeter	EIF 306-4
4.	Study of adder and subtractor IC using 7483 and 7486	1. Connect power supply 2. Check truth tables using multimeter	EIF 306-4
5.	Study of working of RS/D/T/JK flip-flop devices	1. Connect power supply 2. Connect clock circuit 3. Check truth table using LEDs	EIF 306-5
6.	Study of ripple counter using 7476	1. Connect power supply 2. Connect clock circuit 3. Check truth table using LEDs	EIF 306-5
7.	Study of Decade counter IC 7490	1. Connect power supply 2. Connect clock circuit 3. Check truth table using LEDs	EIF 306-5
8.	Study of synchronous counter	1. Connect power supply 2. Connect clock circuit 3. Check truth table using LEDs	EIF 306-5
9.	Design of full adder using multiplexer.	1. Study and connect mux IC as per circuit. 2. Check output.	EIF 306-5
10.	Study of Multiplexer and demultiplexer	1. Connect power supply 2. Check output using circuit.	EIF 306-5
11.	Study of Encoder and decoder	1. Connect power supply 2. Check output using circuit.	EIF 306-5

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

o) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 VI.*

p) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 3 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

Assessment at semester end practical exam as per Pro-forma II.

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Malvino and Leach	Digital Principles and Applications:	Tata McGraw-Hill
2.	Malvino	Digital Computer Electronics	Tata McGraw-Hill
3	R. P. Jain	Modern Computer Fundamentals	Tata McGraw-Hill
4	Bartee	Computer Fundamentals	Tata McGraw-Hill
5	Floyd	Digital Fundamentals	Pearson Education

b) Websites:

1) www.asic-world.com/digital/tutorial.htm
2) www.nptel.ac.in

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COURSE ID :

Course Name : LINEAR INTEGRATED CIRCUITS
Course Code : EIF307
Course Abbreviation : FLIC

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : EIF103

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Theory Examination	Term End Examination		Total
	Theory	Practical		Term Work	Practical Exam	
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 VI	*Practical (3 hours)	
Marks	**20**	**--**	**80**	**25**	**50E**	**175**

E-External Assessment * Assessment as per Pro-forma IV
& Term Work Assessment as per Pro-forma VI.

RATIONALE:

The physical world is inherently analog, indicating that there is always need for analog circuitry. Today the growth of any industry is depending upon electronics to a great extent. Integrated circuit is one of the main component of electronics. This subject acquaints students with general analog principles and design methodologies using practical devices & application.

It focus on process of learning about signal conditioning, signal generation, instrumentation, timing & control using various IC circuitry.

COMPETENCY

Design and build circuitry based on IC741 and IC555 for different engineering applications.

Cognitive : Understanding working principle of IC 741 & IC555 and its applications.

Psychomotor : Constructing and testing circuits based on IC 741 & IC555 for wide range of applications.

Affective : Attitude of i) Logic ii) accuracy iii) precision v) punctuality

COURSE OUTCOMES :

EIF307-1. Apply the basic concepts and parameters of operational amplifier as per requirement.
EIF307-2. Construct feedback amplifiers using op-amp required for various industrial
EIF307-3 Illustrate and examine various linear and non-linear industrial applications of op-amp .
EIF307-4 Demonstrate operation of circuits of oscillators and multivibrators using op-amp .
EIF307-5 Identify types of active filters and construct various types of filters required in real-time applications .
EIF307-6 Demonstrate operation of timer IC555 and PLL and use it for various industrial 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Design and build circuitry based on IC741 and IC555 for different engineering applications	2	3	2	-	-	-	-	1	-	-	2	2
EIF307-1	2	-	-	-	-	-	-	-	-	-	-	-
EIF307-2	2	-	1	-	-	-	-	1	-	-	2	2
EIF307-3	1	2	2	-	-	-	-	1	-	-	-	-
EIF307-4	-	2	2	-	-	-	-	1	-	-	-	-
EIF307-5	-	3	1	-	-	-	-	1	-	-	2	2
EIF307-6	-	3	2	-	-	-	-	1	-	-	2	2

CONTENT :

THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF307-1. Acquire the basic concepts of operational amplifier and its parameters.			
1	**Basics Of Operational Amplifier** 1.1 Differential amplifier-basics 1.2 Circuit Diagram and circuit description only: DIBO,DIUO,SIBO,SIUO 1.3 Block diagram of OP-Amp: 1.3.1 Input Stage 1.3.2 Intermediate Stage 1.3.3 Level Shifting Stage: Need and circuit diagram 1.3.4 Output Stage: Circuit Diagram 1.4 Op-Amp IC-741 pin diagram and function. 1.5 Equivalent Circuit, Circuit Symbols And Terminals 1.6 Ideal OP-AMP and transfer curve Electrical parameters of 741 1.7 Input offset voltage, Input offset current, Input bias current, Differential input resistance, Input capacitance, Offset voltage adjustment range, Input voltage range, CMRR, SVRR, Large signal voltage gain, Output voltage swing, Output resistance, Output short circuit current, supply current, Power consumption, Slew rate	10	12
EIF307-2. Analyze and design various configuration of op-amp.			
2.	**Op-Amp Configuration and Feedback Amplifiers** 2.1 Open Loop and closed loop configuration of op-amp comparison 2.2 Virtual ground, virtual short concept. **Circuit Diagram, operation, Equations and derivation for output for following:-** 2.3 Open loop configuration – Inverting , Non-inverting 2.4 Close loop configuration – Inverting, non-inverting, 2.5 Voltage follower, Inverter (Sign changer) 2.6 Inverting and non-inverting configuration of Adders (summing amplifier, scaling Amplifier, averaging amplifier) 2.7 Subtractor 2.8 Basic and Practical Integrator 2.9 Basic and Practical Differentiator Numerical Examples on based on above circuits	12	14

EIF307-3 Analyze and examine various linear and non-linear applications of op-amp.			
3	**Op-Amp. Applications** **(Circuit Diagram , Operation, Equation and applications)** 3.1 Precision Rectifier: Half wave and Full Wave 3.2 Voltage to current(V to I) converter with floating load and grounded load 3.3 Current to voltage (I to V) converter 3.4 Three op amp Instrumentation amplifier Circuit diagram, operation, advantages& application 3.5 Voltage comparator: 3.5.1 Inverting & non inverting comparator(transfer characteristics) 3.5.2 Zero crossing detector-Inverting & Non-inverting 3.5.3 Window comparators(Detector) 3.5.4 Schmitt Trigger- Inverting & Non-inverting 3.5.5 Comparison between voltage comparator and Schmitt trigger	10	14
	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 II

Sr. No.	**Topics / Sub-topics**	**Lectures (Hours)**	**Theory Evaluation (Marks)**
EIF307-4 Inspect and interpret circuits of oscillators and multivibrators using op-amp			
4	**Waveform Generator** **(Circuit Diagram , Operation & Waveform)** 4.1 Op-amp as an astable multivibrator 4.2 Op-amp as monostable multivibrator 4.3 Op-amp as bistable multivibrator 4.4 Triangular waveform generator 4.5 Wien Bridge oscillator using op-amp 4.6 Phase shift oscillator using op-amp 4.7 Quadrature oscillator 4.8 Study of waveform generator IC's IC 566 block diagram, pin diagram, simple circuit.	8	12
EIF307-5 Analyze operation of active filters and design various types of filters			
5	**Active filters** **5.1** Introduction to filters ,Classification of filters, **5.2** Concept of passive and active filters 5.3 Merits and demerits of active filters over passive filters 5.4 Definition:-cut off frequency, Pass band, Stop	12	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	band, center frequency, roll off rate, BW, Q-factor 5.5 Realistic and ideal response curve of LP, HP, BP, BP, notch filters. 5.6 Order of filter and Need of higher order filter **Circuit Diagram, frequency response, operation equation for gain and cut-off frequency(no-derivation) for following filters:-** 5.7 First order Butterworth Low pass and high pass filters using op-amp 5.8 Second order Butterworth Low pass and high pass filters using op-amp 5.9 Band pass filter (wide band pass , narrow band pass filter) 5.10 Band reject filter(wide band reject, narrow band reject filter) Numerical examples on design of op-amp filters 1st order and 2nd order filters(LPF & HPF)		
EIF307-6 Analyze and interpret operation of timer IC and PLL and its applications.			
6	**Timers and PLL** **6.1 Timer IC's** 6.1.1 555 pin out ,block diagram and specification 6.1.2 555 as monostable multivibrator 6.1.3 555 as astable multivibrator 6.1.4 555 as bistable multivibrator 6.1.5 Industrial application IC 555 as Water level controller **6.2 PLL** 6.2.1 PLL – Block diagram, Operating principle 6.2.2 PLL Transfer Characteristics 6.2.3 Definitions - Center frequency, Lock range, Capture range 6.2.4 IC 565 Block diagram, Pin diagram. And specifications 6.2.5 Applications of PLL Frequency Multiplication, Frequency Synthesizer.	12	14
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Applica--tion		
1	Basics Of Operational Amplifier	02	04	06	EIF 307-1	12
2	Op-Amp Configuration &f/b amplifiers	04	04	06	EIF 307-2	14
3	Op-Amp Applications	04	04	06	EIF 307-3	14
4	Waveform Generators	04	04	04	EIF 307-4	12
5	Active filters	04	06	04	EIF 307-5	14
6	Timers and PLL	04	06	04	EIF 307-6	14
	TOTAL	22	28	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.

C) TERM WORK

Practical Exercises and related skills to be developed :
(Minimum Eight from List)

The following practical exercises shall be conducted on trainer kit/bread-board :-

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	OP Amplifier IC 741	i)Identify Pin out of IC 741. ii) Analyze features of IC 741. iii) Define electrical parameters of IC 741.	EIF 307-1
2.	Inverting Amplifier using op-amp	i)Illustrate operation of Open loop and closed loop Inverting Amplifier ii)Measure and verify the output voltage for various gain for Close loop Inverting Amplifier	EIF 307-2
3.	Non Inv. Amplifier using op-amp	i)Illustrate operation of Open loop and closed loop Inverting Amplifier ii)Measure and verify the output voltage for various gain for Close loop Inverting Amplifier	EIF 307-2
4.	Adder, Subtractor using op-amp	i)Analyze and demonstrate operation of adder and subs tractor ii)Measure and verify the output voltage for various combination of inputs for inverting and non-inverting adder. iii) Measure and verify the output voltage for various combinations of inputs for subtractor.	EIF 307-2
5.	Active Integrator	i)Analyze and demonstrate operation of integrator ii) Verify and plot the output voltage for square wave, sine wave as a input	EIF 307-3
6.	Active Differentiator	i) Analyze and demonstrate operation of	EIF 307-3

		differentiator. ii) Verify and plot the output voltage for square wave, sine wave as a input	
7.	Astable multivibrator using IC555	i) Analyze and demonstrate operation of astable multivibrator. ii) Verify and plot the output voltage for various RC combination iii) Measure the Ton and Toff i.e duty cycle	EIF 307-6
8.	Monostable multivibrator using IC555	i) Analyze and demonstrate operation of monostable multivibrator. ii) Verify and plot the output voltage for various RC combinations. iii) Measure the Ton and Toff i.e duty cycle	EIF 307-6
9.	Low pass filter using op-amp(1^{st} order)	i)Analyze and demonstrate operation of low pass filter ii)Plot frequency Response of filters on semilog paper. iii)Measure and verify cut-off frequency of LPF.	EIF 307-5
10.	High pass filter using op-amp(1^{st} order)	i)Analyze and demonstrate operation of high pass filter ii)Plot frequency Response of filters on semilog paper. iii)Measure and verify cut-off frequency of HPF.	EIF 307-5
11.	Phase lock loop using IC565	Analyze operation of phase lock loop.	EIF 307-6
12.	Mini Project(Compulsory)	Build any circuit on general PCB in a group of 3 students	EIF 307-1-6

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

q) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 VI.*

Sr. No.	**Criteria**	**Marks allotted**
1	Neat & complete circuit Diagram / schematic Diagram.	05
2	Observations & Result Table	05
3	Sample Calculations with relevant	05

	Formulae.	
4	Proper Graphs & Procedure / workmanship Safety measures	05
5	Oral Based on Term Work	05
	Total	25

r) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 3 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

Assessment at semester end practical exam as per Pro-forma IV.

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Ramakant Gaikwad	Operational Amplifier	Prentice Hall, 2000
2.	K.R.Botkar	Integrated Circuits	Khanna
3	Graeme & Tobey	Operational Amplifier	McgrawHill
4	Clayton	Opertional Amplifier	Newnes-Butterworth
5	Drischoll	Basic Op-Amp. Circuits	Prentice Hall, 2000

b) Websites:

1) **www.nptel.ac.in**
2) **www.onlinevideolecture.com**

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COURSE ID:

Course Name :CIRCUITS AND NETWORKS
Course Code :EIF308
Course Abbreviation :FCKN

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Theory Examination	Term End Examination		Total
	Theory	Practical		Term Work	Oral Exam	
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)	-----	Oral	
Marks	**20**	**--**	**80**	-----	**25I**	**125**

I-Internal Assessment * Assessment as per Pro-forma II

RATIONALE:

Basic circuit theory is the foundation of electronics engineering and technology. The development of all engineering topics requires good understanding of fundamental principles in circuit theory, further studying of which develops scientific methodology in the circuit analysis and technical aptitudes in the students. A good foundation in circuit theory is essential for self-development in future to cope up with the innovations and advancement in technology through self-study.

COMPETENCY:

Analyze various circuits and networks for different engineering applications.

Cognitive: Understanding circuit behavior.

Psychomotor: Determining circuit responses using various network theorems.

Affective: Attitude of i) Logic ii) accuracy iii) precision

COURSE OUTCOMES :

EIF308-1 Apply different rules and laws for circuit analysis.
EIF 308 -2 Differentiate series and parallel circuits.
EIF 308 -3 Predict circuit responses using network theorems.
EIF 308 -4 Design RC circuits
EIF 308-5 Analyze output of resonant circuits.
EIF 308-6 Select appropriate filters as per requirement

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

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

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Analyze various circuits and networks for different engineering applications	3	1	2	-	-	-	-	1	-	-	2	-
EIF 308-1	3	-	-	-	-	-	-	-	-	-	-	-
EIF 308-2	2	-	-	-	-	-	-	-	-	-	-	-
EIF 308-3	3	1	2	-	-	-	-	1	-	-	-	-
EIF 308-4	2	1	2	-	-	-	-	1	-	-	3	-
EIF 308-5	2	1	2	-	-	-	-	1	-	-	2	-
EIF 308-6	-	3	2	-	-	-	-	1	-	-	-	-

CONTENT :

D) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF 308-1 Apply different rules and laws for circuit analysis		
1	**Basic Theory** 1.1 Electric charge and current 1.2 AC and DC circuits 1.3 Short and open circuit 1.4 Resistance and ohm's law 1.5 Energy and power in resistor circuits 1.6 Kirchhoff's voltage law 1.7 Kirchhoff's current law 1.8 Voltage divider rule 1.9 Current divider rule **(Numericals on above topic)**	12	14
	EIF 308-2Differentiate series and parallel circuits.		
2.	**Circuit Simplification Techniques** 2.1Series and parallel circuits 2.2Mesh analysis 2.3Nodal analysis 2.4Concept of ground 2.5Voltage and current source 2.6Source transformation **(Numericals on above topics)**	08	12
	EIF308-3 Predict circuit responses using network theorems.		
3	Network Theorems 3.1Superposition theorem 3.2Thevenin's theorem 3.3Norton's theorem 3.4Maximum power transfer theorem **(Numericals on above topics)**	12	14
	Total	**32**	**40**

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF 308-4 Design RC circuits		
4	**R-L AND R-C CIRCUITS** 4.1 Concept of inductor and capacitor 4.2 Concept of impedance and admittance 4.3 Phase relationship between current and voltage in an inductor and capacitor 4.4 Power in inductor and capacitor 4.5 Concept of time constant 4.6 Charging and discharging equations and curves for inductor and capacitor **(Numericals on above topic)**	12	14
	EIF 308-5Analyse output of resonant circuits		
5	**RLC CIRCUITS AND RESONANCE** 5.1 Series resonance 5.2 Parallel resonance 5.3 Bandwidth and quality factor 5.4 Applications of resonance circuits like filters, IF amplifiers (only introduction) **(Numericals on above topic)**	08	10
	EIF 308-6 Select appropriate filters as per requirement		
6	**PASSIVE FILTERS** Necessary diagram and response for following filter types: 6.1 R-L And R-C low pass filter 6.2 R-L And R-C high pass filter 6.3 Series resonant band pass filter 6.4 Parallel resonant band pass filter 6.5 Series resonant band stop filter 6.6 Parallel resonant band stop filter 6.7 Concept of decibel 6.8 Roll off rate	12	16
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Basic theory	4	4	6	EIF 308-1	14
2	Circuit simplification techniques	4	4	4	EIF 308-2	12
3	Network theorems	4	4	6	EIF 308-3	14
4	R-L and R-C circuits	4	4	6	EIF 308-4	14
5	RLC circuits and resonance	3	3	4	EIF 308-5	10
6	Passive filters	5	5	6	EIF 308-6	16
TOTAL	Total	24	24	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.

E) TERM WORK

Practical Exercises and related skills to be developed: (Minimum Eight From List)

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratory 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	Verify series and parallel combination formulae of resistors	• Tracing and Connection of circuit • Calculation of parameters • Formulation of result	EIF 308-2
2	Verification of Ohm's law	1. Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result 4. Plotting of graph	EIF 308-2
3	Verification of KVL	1.Tracing and Connection of circuit 2.Calculation of parameters 3 .Formulation of result	EIF 308-2
4	Verification of KCL	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIF 308-2
5	Verify Superposition Theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIF 308-3

6	Verify Thevenin's theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIF 308-3
7	Verify Maximum Power Transfer theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIF 308-3
8	Verify Norton's theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIF 308-3
9	Frequency response of Low Pass Filter	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result 4.Plotting of graph on semilog paper	EIF 308-6
10	Frequency response of High Pass Filter	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result 4.Plotting of graph on semilog paper	EIF 308-6

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

s) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**25**

ii) Progressive Skill Test :

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

t) Criteria for assessment at semester end oral exam :
Every student has to give oral exam at semester end which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Preparedness for oral	10
2	Correct figures / diagrams	05
3	Correct Answers to questions	10
	Total	25

Assessment at semester end practical exam as per Pro-forma II.

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

REFERENCE MATERIAL:
a) Books / Codes:

Sr. No.	Author	Title	Publisher
1	Sudhakar and Sham Mohan	Circuits and networks	Tata McGraw Hill
2	Ravish R Singh	Electric Networks	Tata McGraw Hill
3	Theodore Bogart	Electric circuits	Macmillan /McGraw Hill

b) Websites:

1). www.tatamcgrawhill.com
2). www.mhne.com/ravish/ens
3).www.electrical4u.com/rlc-circuit

*** * ***

COURSE ID :

Course Name : 8051 MICROCONTROLLER
Course Code : EIF 309
Course Abbreviation : FMCS

TEACHING AND EVALUATION SCHEME:

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

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End Examination		Total
	Theory	Practical	Theory Examination	Practical	
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-I	
Marks	**20**	**--**	**80**	**50E**	**150**

E-External Examination

RATIONALE:

An electronic engineer working in industry has to deal invariably with microcontrollers. In this regard, the course 8051 Microcontroller is designed in such a way that the student undergoing through it will understand not only theoretical background but also design and practical concepts.

The technology of microprocessor has led to a single chip Microcontroller technology MCS-51 family. Architecture, details of 8051 Microcontroller and its programming is covered in this subject. Use of assembler and stimulator for programming of Microcontroller will make the students equipped for the development of embedded systems.

COMPETENCY:

Build 8051 microcontroller based systems for different engineering applications.

Cognitive : Understanding 8051 microcontroller architecture, working and instruction set.

Psychomotor : Write assembly language programs for wide range of applications.

Affective : Attitude of i) Logic ii) accuracy iii) precision v) punctuality

COURSE OUTCOMES:

EIF 309-1 Differentiate among variety of microcontrollers based on their features.
EIF 309-2 Identify/Discover the architectural details of 8051 microcontroller and illustrate its functioning.
EIF 309-3 Use instructions from the instruction set of 8051 to write basic assembly language programs to develop logic.
EIF 309-4 Explore programming skills for I/O ports, Timers/Counters and interrupts of 8051.
EIF 309-5 Design interfacing of I/O devices with 8051 and write programs for it.
EIF 309-6 Develop 8051 microcontroller based systems for various 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Build 8051 microcontroller based systems for engineering applications	-	2	1	1	-	-	-	1	-	1	2	1
EIF 309-1	-	1	-	-	-	-	-	-	-	1	-	-
EIF 309-2	-	1	-	-	-	-	-	-	-	1	-	-
EIF 309-3	-	3	1	-	-	-	-	1	-	1	1	-
EIF 309-4	-	3	3	1	-	-	-	1	-	1	3	2
EIF 309-5	-	3	3	1	-	-	-	1	-	1	3	2
EIF 309-6	-	3	3	1	-	-	-	1	-	1	3	2

CONTENT:

THEORY : SECTION I

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
EIF 309-1 Differentiate among variety of microcontrollers based on their features.			
01	**Introduction and Overview of 8051 family** 1.1 Introduction to single board microcomputer. 1.1.1 Block Diagram of Microcomputer. 1.1.2 Elements of Microcomputer. (Buses, Microprocessor, memory, I/O devices). 1.1.3 Different types of buses: address, Data, and control bus 1.2 Introduction to Microcontroller 1.2.1 General block diagram of microprocessor and microcontroller 1.2.2 Comparison of Microprocessors and Microcontrollers. 1.2.3 Types of architectures - Harvard and Von-neuman. 1.3 Selection factors of microcontroller (Architecture type, speed, Word size, instruction set, memory, and I/O capability) 1.4 8051 family members and its comparison– 8052, 8031, 8751, AT89C51, DS89C4x0 1.5 Introduction to Microcontroller programming simulation software like – KEIL compiler	06	08
EIF 309-2 Identify/Discover the architectural details of 8051 microcontroller and illustrate its functioning.			
02	**8051 Architecture** 2.1 8051 Architecture 2.1.1 Features 2.1.2 Architectural block diagram, 2.1.3 Pin description of 8051 2.1.4 Accumulator and B register, PSW 2.1.5 Memory Organization: Internal RAM and ROM Only architectural features of following 2.1.6 I/O ports 2.1.7 Timers/Counters-TCON,TMOD 2.1.8 Serial port-SCON,PCON,SBUF 2.1.9 Interrupts-IE,IP 2.2 Special Features of 8051 2.2.1 Boolean Processor 2.2.2 Power saving options- idle and power down mode.	12	16

EIF 309-3 Use instructions from the instruction set of 8051 to write basic assembly language programs to develop logic.			
03	**Instruction set and programming:** 3.1 Instruction format and addressing modes 3.2 Data transfer instructions 3.3 Logical and rotate instructions 3.4 Arithmetic instructions 3.5 Jump and call instructions 3.6 simple programs	14	16
	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 II

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
EIF 309-4 Explore programming skills for I/O ports, Timers/Counters and interrupts of 8051.			
04	**Programming of 8051:** 4.1 Timer/Counter programming 4.1.1 Timer / Counter logic and modes 4.2.2 Simple programs on timer to generate time delay using polling and interrupt method. 4.2 Parallel Port-I/O port Structure and its Programming 4.3 Serial port of 8051 4.3.1 Modes of serial communication 4.3.2 Simple programs for serial communication 4.4 8051 Interrupts 4.4.1 Interrupts and polling. 4.4.2 Simple programs based on interrupts and polling method	12	16
EIF 309-5 Design interfacing of Memory & I/O devices with 8051 and write programs for it.			
05	**Memory and I/O Interfacing** 5.1 Memory Interfacing- 5.1.1Interfacing External RAM and ROM 5.2.2 Address Map table 5.2.3 Linear and absolute decoding techniques 5.2.4 Simple example showing interfacing of ROM and RAM(upto 8X8K) 5.2 I/O Interfacing: 5.2.1 Interfacing of LED, keys, Relays,		14

	Seven segment display 5.2.2 Port expansion using 8-bit bidirectional buffer like 74LS245		
EIF 309-6 Develop 8051 microcontroller based systems for various applications.			
06	**Applications** Interfacing diagram with programming of following with 8051 6.1 Key-board interfacing (4X4 Matrix keyboard), concept of key bouncing and de-bounce logic. 6.2 LCD display interfacing 6.3 8 bit ADC and DAC interfacing (0808/0809) 6.4 Stepper Motor interfacing	10	10
	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.			

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

Topic no.	Name of the Topic	Distribution Of Marks (Level Wise)			Course Outcome	Total Marks
		Remember	Understand	Applications		
1	Introduction & Overview of 8051 family	6	2	0	EIF 309-1	08
2	8051 Architecture	4	6	6	EIF 309-2	16
3	Instruction set and programming	4	4	8	EIF 309-3	16
4	Programming of 8051	4	2	10	EIF 309-4	16
5	Memory and I/O Interfacing	4	4	6	EIF 309-5	14
6	Applications	2	2	8	EIF 309-6	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.

A) TERM WORK Term work shall consist of the following :
(Minimum Eight From List)

Practical Exercises and related skills to be developed :

Sr No	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Introduction to KEIL Compiler software	Use KEIL compiler software for assembly language programming 8051microcontroller	EIF 309-1
2	Addition and subtraction of 8	1. Acquire Logical thinking ability	EIF 309-3

Sr No	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
	& 16 bit numbers, 8-bit addition of BCD numbers	2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	
3	Multiplication and division of 8 bit numbers	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-3
4	Block transfer and Block Exchange	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-3
5	Even & odd number	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-3
6	Largest and smallest number	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-3
7	Ascending & Descending order	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-3
8	Square wave generation using timer delay	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-4
9	Serial Transmission	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Writing, Compiling, debugging, and execution of program	EIF 309-4
10	Stepper motor interfacing	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Interfacing given stepper motor with 8051 MC 4. Writing program for rotating motor in clockwise/anticlockwise 5. Compiling, debugging, and	EIF 309-4 , 5

Sr No	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
		execution of program	
11	Display given message (LCD interfacing)	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Interfacing LCD with 8051 MC 4. Writing, Compiling, debugging, and execution of program	EIF 309-4, 6
12	ADC/DAC Interfacing	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Interfacing given ADC/DAC with 8051 MC 4. Writing program for conversion, 5. Compiling, debugging, and execution of program	EIF 309-5 6
13	LED, Relay, Keyboard Interfacing	1. Acquire Logical thinking ability 2. Identify the suitable instructions for the given problem 3. Interfacing LED ,Relay ,Keyboard with 8051 MC 4. Writing, Compiling, debugging, and execution of program	EIF 309-5,6
14	Mini Project(Compulsory)	8051 based measurement system having ADC/DAC, LCD,etc (Any application)	EIF309-4,5,6

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.

ii) Progressive Skill Test:

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

Criteria for Progressive Assessment of Practical and Skill Test

Domain	Particulars	Marks out of 50
Cognitive	Technical preparedness for practical	05
Psychomotor	Algorithm /Flowchart	05
	Program/Logic	05
Affective	Discipline and punctuality	05
	Decency and presentation	05
TOTAL		**25**

b) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria

Domain	Particulars	Marks out of 50
Cognitive	Technical Ability	05
	Logical Approach	05
Psychomotor	Presentation/ Algorithm and Flowchart	10
	Programming skill	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		**50**

Assessment at semester end practical exam as per Pro-forma I

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. PPT Slides
4. Question Bank
5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1	Keneth J. Ayala	The 8051 Microcontroller	PenRam International
2	M. A. Mazidi	The 8051 Microcontroller and Embedded systems	Pearson Edition, Prentice Hall
3	Ajay Deshmukh	Microcontrollers (Theory & Applications)	Tata Mcgraw Hill

b) Websites:

1. www.nxp.com
2. www.datasheet.com
3. www.nptel.ac.in

COURSE ID :
Course Name : ELECTRICAL MACHINES
Course Code : IEF 310
Course Abbreviation : FEMC

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : EIF107
Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination		Total
	Theory	Practical	Theory Examination	Oral	
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-I	
Marks	**20**	**--**	**80**	**25I**	**125**

*I-Internal Assessment * Assessment as per Pro-forma II.

RATIONALE :

Electronics diploma holders have to operate electrical machines and control their speed, power factor, efficiency ,torque, etc. This course aims to arm the students with the basic required knowledge in respect of operating various DC and AC machines.

COMPETENCY :
Use appropriate electrical machines in industrial applications.

Cognitive :i) Understanding and applying principles of working of electrical machines by ii)Observing iii) Classifying iv) Interpreting
Psychomotor : Handling electrical machines and tools.
Affective : Skill of i) working in team ii) curiosity, interest and self-confidence

COURSE OUTCOMES:
IEF 310-1 Use DC machines in industrial applications.
IEF 310-2 Select transformers relevantly and use them in industrial applications.
IEF 310-3 Select three phase induction motors relevantly and use them in industrial applications.
IEF 310-4 Select relevant single phase induction motors and use them in industrial applications.
IEF 310-5 Use appropriate alternators as per requirement.
IEF 310-6 Select the relevant special motors for industrial 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Understand fundamental principle and concept of basic electronic devices	-	2	3	-	-	-	-	-	-	-	3	3
IEF 310-1	1	2	2	-	-	-	-	-	-	-	2	2
IEF 310-2	-	3	3	-	-	-	-	-	-	-	3	3
IEF 310-3	-	3	3	-	-	-	-	-	-	-	3	3
I IEF 310-4	-	3	3	-	-	-	-	-	-	-	3	2
IEF 310-5	-	3	3	-	-	-	-	-	-	-	3	2
IEF 310-6	-	3	3	-	-	-	-	-	-	-	3	3

CONTENT :
THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	IEF310-1 Use DC machines in industrial applications		
1	**1.D. C. Machines** 1.1 Construction 1.2 Principle of operation of D.C. Machine as a) Generator b) Motor 1.3 Classification of D.C. Generators & D.C Motors Schematic Diagram 1.4 EMF equation of Generator 1.5 Characteristics & application of series, shunt & compound generator. 1.6 Concept of Back EMF in case of DC motors. 1.7 Voltage & torque equation. 1.8 Characteristics & application of series, shunt & compound motor. 1.9 Three point starter- Necessity, Construction, Working	05	08
	IEF310-2 Select transformers relevantly and use them in industrial applications		
2	**Transformer** 2.1 Definition of Transformer 2.2 Working Principle of Transformer 2.3 Transformation Ratios – Voltage & Current Ratios 2.4 Types of Transformer according to no. of phase , construction ,function ,duty hours 2.5 Construction of single phase Transformer 2.6 E.M.F.equation of Transformer 2.7 Transformer on no load 2.8 Transformer on load (No phasor diagram) 2.9 Transformer with resistance & reactance 2.10 Equivalent circuit referred to primary 2.11 Equivalent circuit referred to secondary 2.12 O.C test & S.C. test 2.13 Losses in Transformer 2.14 Definition – Efficiency & voltage regulation 2.15 Condition for maximum efficiency 2.16 Numerical on equivalent circuits, efficiency and voltage regulation 2.17 Concept of isolation transformer 2.18 Constructional details & working of isolation transformer 2.19 Application of isolation transformer 2.20 Concept of Distribution transformer	09	16

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	2.21 Importance of Neutral wire for Distribution transformer 2.22 Importance of Earthing for Distribution system 2.23 Differentiate between Neutral conductor & Earthing 2.24 Types of earthing- pipe & plate earthing explanation wtih suitable diagram		
IEF310-3 Select three phase induction motors relevantly and use them in industrial applications			
3	**3 Induction Motor** 3.1 Types of 3 phase induction motor 3.2 Constructions according to types 3.3 Working Principle 3.4 Production of rotating magnetic field by 3 phase supply in 3 phase winding 3.5 Synchronous speed – speed of slip 3.6 Slip of an induction motor 3.7 Starting & running condition of 3 phase induction motor 3.8 Magnitude of rotor frequency, rotor induced emf & power factor at starting & running condition. 3.9 Torque under starting & running condition. 3.10 Torque slip characteristics. 3.11 Condition for maximum torque. 3.12 Ratio of full load torque to starting torque. 3.13 Ratio of full load torque to maximum torque. 3.14 Numericals on 3.8 to 3.13 3.15 Power flow diagram for 3 phase induction motor 3.16 Relationship among rotor input, rotor output & rotor copper losses 3.17 Numericals on 3.15 & 3.16 3.18 Study of starters-Auto Transformer , Rotor Resistance Starter ,Star Delta Starter 3.19 Applications of 3 phase squirrel cage motor and slip ring induction motor	10	16
	TOTAL	24	40

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
IEF310-4 Select relevant single phase induction motors and use them in industrial applications.			
4	Single Phase induction motor Following motors are studied w.r.t a) Construction b) Working Principle c) Operation d) Speed Torque characteristics e) Applications A) Capacitor start capacitor run motor B) Shaded Pole induction motor C) A.C. Series Motor D) Repulsion Motor	06	12
IEF310-5 Use appropriate alternators as per requirement			
5	Three Phase Alternator 5.1 Constructional Detail 5.2 Types of alternator according to the rotor construction 5.3 Advantages of stationary armature 5.4 Excitation for rotating field system 5.5 E.M.F Equation 5.6 Definition – Pitch factor , Distribution factor 5.7 Numericals on emf equation 5.8 Alternator on load with lag , lead & unity power factor 5.9 Definition – Voltage regulation 5.10 To find regulation by synchronous impedance method 5.11 Differentiate between alternator & D.C.Generator	12	16
IEF310-6 Select the relevant special motors for industrial applications			
6	**Special Motors** Construction , working principle , Characteristics ,applications a) Unidirectional and bi-directional stepper motor b) Permanent magnet stepper motor with 2 phase winding c) Variable reluctance stepper motor d) D.C. Servo Motor e) A.C Servo Motors :Single Phase, Two Phase & Drag cup servo motor	06	12
	TOTAL	24	40

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

Section / Topic no.	Name of topic	Distribution of marks			Course Outcome	Total marks
		Remember	Understand	Application		
I / 1	D. C. Machines	02	02	04	IEF 310-1	08
I / 2	Transformer	04	04	08	IEF 310-2	16
I / 3	Induction Motor	04	04	08	IEF 310-3	16
II / 4	Single Phase induction motor	06	06	-	IEF 310-4	12
II / 5	Three Phase Alternator	04	04	08	IEF 310-5	16
II/6	Special Motor	06	06	-	IEF 310-6	12
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.

B) TERM WORK

Term work shall consist of the following : (Minimum Eight practical's from List)

Laboratory experiments and related skills to be developed :

Sr. No.	Title of Experiment	Skills to be developed	CO
1.	Construction of D.C. Machine.	1. Identify parts of the machine.	IEF 310-1
2.	Load characteristics of D.C. Shunt Generator.	1. Perform the test and provide conclusion	IEF 310-1
3	Speed control of D.C . Shunt motor by armature voltage control method and field Control method.	1. Perform the test and provide conclusion	IEF 310-1
4	Three point starter of DC shunt motor.	1. Connect the starter and run the machine	IEF 310-1
5	Load test on 1 ph Transformer to find efficiency and regulation .	1. Perform the test and provide conclusion	IEF 310-2
6	To perform O.C. test and S.C. test on 1 ph Transformer	1. Perform the test and provide conclusion	IEF 310-2
7	Construction of 3 ph Induction Motor.	1. Identify parts of the machine	IEF 310-3
8	Reversal of rotation of 3 ph Induction Motor.	1. To connect as per circuit diagram 2. To observe the direction of rotation 3. To conclude from the method	IEF 310-3
9	Starters for Induction motors. a) DOL Starter b) 3-Phase Auto-transformer starter c) Rotor Resistance starter	1. To show all starters. 2. To draw circuit diagram of all starters 3. To connect all types of starters	IEF 310-3
10	Construction of 1 phase Induction Motor.	1. Identify parts of the machine	IEF 310-3

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

Assessment at semester end practical exam as per Pro-forma II.

.**Criteria for assessment at semester end practical exam:**

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

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

1. Lectures cum Discussions 2. Regular Home Assignments. 3. …

Teaching and Learning resources :

1. Chalk board 2. O.H.P. 3. Slides 4. Item Bank 5. …

REFERENCE MATERIAL :

a) Books

Sr.No	**Title**	**Author**	**Publisher & Address**
1	Electrical Technology	E. Hughes	Logmans, London
2	Electrical Technology	H. Cotton	C. B. S. Publisher New Delhi
3.	Electrical Technology Vol. II	B. L. Theraja	S. Chand & C0 Delhi
4.	Electrical Machine Design	A. K. Sohawney	Dhanpatrai & Sons, New Delhi
05	S. K. Bhattacharya	Electrical Machines	TTTI, Chandigarh
06	C.L.Dawes	Electrical engineering	T. M. G. H.

COURSE ID :

Course Name : NON- CONVENTIONAL ENERGY SOURCES
Course Code : EIF311
Course Abbreviation : FNCE

TEACHING AND EVALUATION SCHEME:

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

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	--	One paper (3 hour)	Practical (3 hours)	--	
Marks	20	--	80	--	--	100

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, and energy audit and waste heat recovery techniques.

COMPETENCY: Develop and operate different non-conventional energy sources

Cognitive: Understand importance and scope of various non-conventional energy..

Psychomotor: Use of various non-conventional energy conversion equipments .

Affective: Develop awareness of energy conservation.

COURSE OUTCOMES:

EIF311-1 Develop awareness for effective utilization of non-conventional energy sources.

EIF311-2 Describe different components of solar energy and wind energy devices and their functions.

EIF311-3 Recognize the scope and working of biomass plant.

EIF311-4 Identify various non-conventional energy sources for energy conservation.

EIF311-5 Apply energy conservation technique and principles of energy management in industrial sectors.

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

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

Competency and COs	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competeny.	1	-	-	-	1	2	-	-	-	1	-	-
EIF311-1	1	-	-	-	1	2	-	-	-	1	-	-
EIF311-2	1	-	-	-	1	2	-	-	-	1	-	-
EIF311-3	1	-	-	-	1	2	-	-	-	1	-	-
EIF311-4	1	-	-	-	1	2	-	-	-	1	-	-
EIF311-5	1	-	-	-	1	2	-	-	-	1	-	-

CONTENT:

A) THEORY : Section-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF311-1 Develop awareness for effective utilization of non-conventional energy sources		
1	**SOLAR ENERGY** 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.	**10**	**20**
EIF311-2 Describe different components of solar energy and wind energy devices and their functions			
2	**WIND ENERGY** 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.	**08**	**12**
EIF311-3 Recognize the scope and working of biomass plant			
3	**BIO-MASS ENERGY** 3.1 Biomass conversion technologies - 1) combustion 2) Thermo chemical 3) Biochemical. Wet processes, Dry processes. 3.2 Biogas generation – anaerobic digestion,	**06**	**08**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	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 half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			
Section – II			
EIF311-4 Identify various non-conventional energy sources for energy conservation			
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.	**06**	**08**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF311-5 Apply energy conservation technique and principles of energy management in industrial sectors			
5	**OTHER ALTERNATE SOURCES OF ENERGY** 5.1 Geothermal Energy –Sources, Principle, Geothermal energy power plant, Advantages ,Limitation and application of Geothermal Energy. 5.2 Small Hydroelectric Plant(Mini and Micro hydel): Nature, Classification of SHP station, 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) Power Generation- Principles, MHD system, Advantages, Future Prospects	**09**	**16**
6	**ENERGY CONSERVATION AND MANAGEMENT** 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	**09**	**16**
	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 marks only.			

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

Topic No.	Name of topic	Distribution of marks			Total marks
		Knowledge	Comprehension	Application	
1	Solar Energy	10	04	06	20
2	Wind Energy	04	04	04	12
3	Bio-Mass Energy	04	02	02	08
4	Energy From the Oceans	02	04	02	08
5	Other Alternate Sources of Energy	08	04	04	16
6	Energy Conservation and Management	04	04	08	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 No.	**Title of Practical Exercise**	**Skills / Competencies to be developed**
1.	Study and Demonstration on solar flat plate collector used for water heating.	Use and working of Solar flat plate collector.
2.	Study and Demonstration working of photo voltaic cell.	Use and working of Photo voltaic cell.
3.	Demonstration on working of solar cooker.	Using the solar cooker.
4.	Visit to Mini and Micro hydel power plant.	Awareness to hydel power plant
5.	Visit to solar heating system/ wind power plant.	Awareness of solar heating system/ wind power plant.
6.	To study construction and working of horizontal axis wind mill or to visit a nearest wind farm.	Use and working of wind mill.
7.	To study construction and working of a biomass/ biogas plant or visit a biomass/ biogas plant of municipal waste or elsewhere.	Use and working of Biogas plant.
8.	Case study on Energy Audit.	Suggest the methods of energy saving

C. INDUSTRIAL EXPOSURE:

SN	**Mode of Exposure**	**Topic**
1.	Industrial Visits	Wind Energy and Biomass Energy
2.	Industrial Visits	Solar heating system

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

Sr. No.	Author	Title	Publisher
1.	Dr B.H.Khan	N 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 Domkundwar	Power plant engineering	Dhanpat Rai & Co.
7	P.H. Henderson	India- The energy sector	OxfordUniversity Press
8	D. A. Ray	Industrial energy conservation	Pergaman Press
9	W. C. Turner	Energy management handbook	Wiley Press

b) Websites

i)www.mahaurja.com
ii) www.indiasolar.com
iii)www.beeindia.in

* * *

COURSE ID :

Course Name : HIGHER MATHEMATICS
Course Code : EIF 312
Course Abbreviation : FHMT

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Applied Mathematics(EIF 301)

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Tutorial	01	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	Assignments given by teacher	Term End Theory Exam (03 hours)	--	--	
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. 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. Fourier Series finds its applications in wide number of topics in electronics field.

COMPETENCY

The course should be taught and implemented with the aim to apply mathematical technics to engineering field.

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:

EIF312.1 Apply methods of finite differences to Engineering and technical field..

EIF312.2 Apply rules and methods of partial differentiation to solve Engineering and technical Problems

EIF312.3 To equip student with tools of Laplace transform and Linear Differential equations with constant coefficients to enable him to use in Engineering and technology.

EIF 312.4 To equip a student with the knowledge and tool of expressing any function in Fourier expansion series

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 and COs	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
The course should be taught and implemented with the aim to apply mathematical technics to engineering field	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
EIF 312-1	**2**	-	**1**	-	-	-	-	-	-	-	2	1
EIF312-2	**2**	-	**1**	-	-	-	-	-	-	-	1	1
EIF312-3	**2**	1	**1**	-	-	-	-	-	-	1	3	2
EIF 312-4	**2**	1	**1**	-	-	-	-	-	-	1	3	2

CONTENT:
THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 312-1 Apply methods of finite differences to Engineering and technical field..			
1	1 **FINITE DIFFERENCE** Finite differences, forward difference Δ , 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**
EIF 312-2 Apply rules and methods of partial differentiation to solve Engineering and technical Problems			
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.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)
EIF 312-3 To equip student with tools of Laplace transform and Linear Differential equations with constant coefficients to enable him to use in Engineering and			
3	3 **LAPLACE TRANSFORM** 3.1 Definition ,Linearity property 3.2 Laplace Transforms of Standard functions 3.3 First shifting property 3.4 Examples on Multiplication by t^n 3.5 Examples on Division by t 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	12	**20**
EIF 312-4 To equip a student with the knowledge and tool of expressing any function in Fourier expansion series			
4	4 .**FOURIER SERIES** 4.1 Definition by using Dirichlet's conditions 4.2 Expansion of functions in Fourier series in the intervals (0,2π) , (-π,+π) ,(0,2l) ,(-l,l) 4.3 Even & Odd function in (-π,+π) & ,(-l,l)	**12**	**20**
	Total	**24**	**40**

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

Topic No.	Name of topic	Distribution of marks (level wise)			Total Marks
		Knowledge	Comprehensio	Application	
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.

A. PRACTICALS.

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

Sr No.	Topic	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 theo. 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	Laplace transform	Examples on Applications of L.T.
9	Fourier Series	Examples on F,S. in interval (0,2π) ,(-π.π)
10	Fourier Series	Examples to (0,2l),(-l,l)

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

* * *

LEVEL -IV
APPLIED TECHNOLOGY COURSES

COURSE ID :

COURSE NAME : POWER ELECTRONICS-1
Course Code : EIF 401
Course Abbreviation : FPE1

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	**Progressive Assessment**		Theory Examination	**Term End Examination**		**Total**
	Theory	Practical		Term Work	Practical Exam	
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)	------	One practical (2 hours)	
Marks	**20**	**--**	**80**	-----	50 E	**150**

* Assessment as per pro-forma I E – external Examination

RATIONALE:

Day by day the change in Electronics Industry is dynamic. The role of diploma engineers changed over the years. Engineers should have knowledge of power electronics. Electronics control circuits have major role in industries for which study of power devices are essential. Concept of electronics devices and circuits along with the application are necessary. Power electronics 1 is the foundation subject to study industrial drives and advanced industrial electronics. This subject deals with the understanding of electronic semiconductor switches from thyristor family.

COMPETENCY:

Acquire knowledge about various electronic semiconductor switches from thyristor family& using them designing some power control circuits.

Cognitive : Understanding operating principle ,characteristics of semiconductor electronic switches from thyristor family'

Psychomotor : Develop skills to build, and troubleshoot power electronics circuits..

Affective : Attitude of i) Logic ii) accuracy iii) precision v) punctuality vi) Fault finding.

COURSE OUTCOMES:

EIF401-1 Understanding of electronic semiconductor switches from thyristor family

EIF401-2 Describe different turn on methods of thyristor.

EIF401-3 Express commutation methods of thyristor.

EIF401-4 Analyze Series and parallel connection of SCR

EIF401-5 Acquire knowledge of uncontrolled rectifier circuit .

EIF401-6 Identify Controlled rectifier circuit.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Acquire knowledge about various electronic semiconductor switches from thyristor family & using them designing some power control circuits.	-	3	3	--	--	--	--	1	--	--	3	3
EIF401-**1**	2	-	2	--	--	--	--	1	--	--	1	1
EIF401-**2**	1	2	2	--	--	--	--	1	--	--	2	2
EIF401–**3**	1	2	2	--	--	--	--	2	--	--	3	2
EIF401–**4**	1	2	-	--	--	--	--	-	--	--	3	3
EIF401–**5**	1	2	-	--	--	--	--	-	--	--	3	3
EIF401–**6**	--	3	2	--	--	--	--	2	--	--	3	3

CONTENT:

A) THEORY : Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF401-1 understanding of electronic semiconductor switches from thyristor family			
1	**Power electronic semiconductor switches** 1.1 Need for high power semiconductor switches. 1.2 power transistor(Symbol, Construction, Characteristics) 1.2 SCR 1.2.1 Symbol, Construction (doping levels of layers) 1.2.2 Transistorized equivalent circuit. Operating principle 1.2.3 Characteristics, Specifications- Anode current - holding & latching current, on state voltage, VBO, turn on,turn off time etc. 1.3 TRIAC 1.3.1 Layer diagram , operating principle 1.3.2 four modes of operation 1.3.3 Triac characteristics. 1.4 Ideal switch characteristics 1.5 Triggering devices– layer diagram , Characteristics , operating principle , specifications of 1.5.1 UJT 1.5.2 PUT 1.5.3 DIAC.	14	18
EIF401-2 Describe different turn on methods of thyristor.			
2	**Triggering methods of thyristors** 2.1 Mechanisms with which SCR turns on: 2.1.1 Voltage triggering 2.1.2 Gate triggering 2.1.3 dv /dt triggering – (specification – dv/dt rating) 2.1.4 Light triggering 2.1.5 Temp triggering. 2.2 Advantages of gate triggering. 2.3 Pulse triggering (using active components) 2.3.1 Requirements of pulse to trigger SCR successfully, Pulse width, Pulse amplitude & gate current. 2.4 UJT relaxation oscillator:	08	12

	2.4.1Circuit , operating principle 2.4.2 expression for time period , Maximum & minimum value of timing resistor 2.4.3 Waveforms. 2.5 PUT relaxation oscillator: 2.5.1Circuit , operating principle 2.5.2 expression for time period , waveforms 2.6 Advantage of PUT over UJT. 2.7 Triac triggering using Diac.		
EIF401-3 Express commutation methods of thyristor.			
3	**Commutation circuits.** 3.1 Turn off mechanism of SCR 3.2 Specifications related to turn off: Turn off time 3.3 Types of commutation methods. 3.3.1. Resonant turn off - Class A ,Class B 3.3.2. Parallel Capacitance turn off using auxiliary SCR - Class C, Class D 3.3.3 Coupled pulse turn off - Class E 3.3.4 Natural turn off - Class F	10	10
	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 II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF401-4 Analyze Series and parallel connection of SCR		
4	**Series and parallel connection of SCR** 4.1 Series connection 4.1.1 Need of series connection 4.1.2 Reason for unequal distribution of voltage 4.1.3 Voltage equalization circuits- dynamic & static 4.2 Parallel connection 4.2.1 Need of parallel connection 4.2.2 Reasons of unequal distribution of current 4.2.3 Current equalization networks	10	12
	EIF401-5 Acquire knowledge of uncontrolled rectifier circuit.		
5	AC to DC converter - Uncontrolled rectifier 5.1 Uncontrolled Rectifier 5.1.1 Uncontrolled rectifier: Meanings, Review of single phase uncontrolled rectifier. 5.1.2 Three Phase uncontrolled rectifier 5.1.3 Advantages of 3Ø uncontrolled rectifier 5.1.4 Three Phase transformer delta – star connection (review) 5.1.5 Three Phase half wave uncontrolled rectifier: Circuit , vector diagram 5.1.6 operating principle , input & output voltage waveforms 5.1.7 expression for average output voltage & rms output voltage (no derivation) 5.2 Three phase bridge rectifier Circuit, vector diagram, 5.2.1 operating principle, input & output voltage waveforms 5.2.2 expression for average output voltage & rms output voltage, 5.3 Performance paramETFrs of both rectifier 5.3.1. Efficiency 5.3.2. Form factor 5.3.3. Ripple factor 5.3.4. PIV 5.3.5 TUF	08	12
	EIF401-6 Identify Controlled rectifier circuit.		
	AC to DC converter -Controlled rectifier 6.1 Controlled Rectifiers: Meaning, AC phase control principle. 6.1.1 Single phase half wave controlled rectifier with		

6	resistive load circuit, Operating principle , waveforms 6.1.2 Single phase half wave controlled rectifier with RL load: Concept of inductive load with example, Circuit , operating principle , waveforms 6.1.3 Concept of load & source (review) 6.1.4 Concept of two quadrant operation, power feedback (Regeneration), power factor. 6.1.5 Single phase half wave controlled rectifier with RL load & free wheeling diode: circuit, Operating principle 6.2.1 Single phase full wave controlled rectifier with resistive load circuit, Operating principle , waveforms 6.2.2 Single phase full wave controlled rectifier with RL load: Concept of inductive load with example, Circuit , operating principle , waveforms 6.2.3 Concept of load & source (review) 6.2.4 Concept of two quadrant operation, power feedback (Regeneration), power factor. 6.2.5 Single phase full wave controlled rectifier with RL load & free wheeling diode: circuit, Operating principle	14	16
	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.			

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

Section / Topic no.	Name of topic	Distribution of marks				Total marks
		Knowledge	Comprehension	Application	Course outcome	
I/1	Semiconductor switches	5	5	8	EIF401-1	18
I/2	Triggering methods of thyristsor	4	3	5	EIF401-2	12
I/3	Commutation circuits	3	3	4	EIF401--3	10
II/4	Series and parallel connection of SCR	4	3	5	EIF401--4	12
II/6	AC to DC converter-uncontrolled rectifier	4	3	5	EIF401--5	12
II/7	AC to DC converter-controlled rectifier	5	5	6	EIF401--6	16
	Total	25	22	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 Term work shall consist of the following :
(Minimum Eight From List)

Laboratory experiments and related skills to be developed:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	To study the characteristics of SCR	1. To understand and study the characteristic and diff. points in it. 2. To plot graph of V-I characteristics	EIF401-1
2.	To study the characteristics of Diac	1. To understand and study the characteristic and diff. points in it. 2. To plot graph of V-I characteristics	EIF401-1
3.	To study the characteristics of Triac	1. To understand and study the characteristic and diff. points in it. 2. To plot graph of V-I characteristics	EIF401-1
4.	Study the phase control using Diac and Triac.	1. Know how the Diac is used to trigger Triac. 2. To plot graph of V-I characteristics	EIF401-2
5.	Flasher using SCR.	1. To study the flasher circuit.	EIF401-2, EIF401-3
6.	To study the characteristics of PUT.	1.To understand and study the characteristic and diff. points in it.	EIF401-1
7.	To study the SCR commutation circuits(class A,B,C)	1.To study resonant turn off, using auxiliary SCR	EIF401-3
8.	To study the SCR commutation circuits(class D,E,F)	1.To study auxiliary SCR, coupled pulse tu off, natural turn off	EIF401-3
9.	To study Half controlled rectifier	1.Draw Ciruit Diagram And Waveform.	EIF401-6
10.	To study full controlled rectifier	1. Draw Ciruit Diagram And Waveform	EIF401-6

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 .

ii) Progressive Skill Test :

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

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

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Presentation	05
3	Conceptual understanding	05
5	Proper procedure /safety measures	05
6	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 3 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. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Deodatta Shingare	Industrial and Power Electronics	Tata McGraw Hill
2.	P.C. Sen	Power Electronics	Tata McGraw Hill
3	M.D.Singh&K.B.Khanchandani	Power Electronics	Tata McGraw Hill

b)Websites:

1) www.circuitstodav.com
2) www.daenotes.com
3) www.electronicsinstrumentsmanufacturer.com
4) www.talkingelectronics.com
5) www.bbs.sciencenet.net

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COURSE ID :

Course Name : EMBEDDED SYSTEMS
Course Code : EIF402
Course Abbreviation : FEMB

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
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)	------	Practical (3 hours)	
Marks	**20**	**--**	**80**	-----	**50E**	**150**

E-External Examination * Assessment as per Pro-forma I

RATIONALE:

Embedded system is a new trend in the field of automation. The subject has been introduced in order to enhance the knowledge of microcontroller programming. This subject will help a student to design small embedded systems and write the code for the same.

COMPETENCY:

Design & implement 8051 microcontroller based systems for real time applications.

Cognitive: Understand embedded C programming and peripheral interfacing.

Psychomotor: Write embedded C programs for wide range of applications.

Affective: Attitude of i) Logical thinking ability ii) System hardware design skills.

COURSE OUTCOMES:

EIF 402-1 Understand the fundamentals of Embedded C programming for 8051 microcontroller.
EIF 402-2 Develop the critical timing related and real time event counter applications.
EIF 402-3 Develop the applications based on 8051 interrupts using embedded C.
EIF 402-4 Interface and program for various I/O devices(sensors, displays, RTC etc) with 8051 microcontroller.
EIF 402-5 Interface and program for various peripheral I/O devices with 8051 microcontroller.
EIF 402-6 Design and implement 8051 microcontroller based systems for real time 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Design & implement 8051 microcontroller based systems for real time applications.	-	2	3	2	-	-	-	1	-	-	3	3
EIF 402-1	1	1	2	-	-	-	-	1	-	-	2	2
EIF 402-2	-	3	2	-	-	-	-	1	-	-	2	2
EIF 402-3	-	3	2	1	-	-	-	1	-	-	2	2
EIF 402-4	1	2	2	1	-	-	-	1	-	1	3	3
EIF 402-5	1	2	2	1	-	-	-	1	-	1	3	3
EIF 402-6	-	3	-	-	-	-	-	-	-	1	3	3

CONTENT:

A) THEORY :

Section I

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
EIF402-1 Understand the fundamentals of Embedded C programming for 8051 microcontroller.			
01	**8051 Programming in C:** 1.1 Overview of 8051 architecture 1.2 Data types and time delay in 8051 using C 1.3 I/O programming in 8051 using C 1.4 Logic operations in 8051 using C 1.5 Data conversion programs in 8051 using C 1.6 Accessing code ROM space in 8051 using C 1.7 Data serialization in 8051 using	08	10
EIF402-2 Develop the critical timing related and real time event counter applications.			
02	**8051 Timer, Serial port programming in C:** 2.1 Programming 8051 timers(mode 0,1,2) in C 2.1.1 Generation of time delay using timer 2.1.2 Square wave generation at port pin of various duty cycle 2.1.3 timer as a counter 2.2 Basics of serial communication 2.3 Connection of 8051 to RS232 2.4 Serial port programming in C.	12	14
EIF402-3 Develop the applications based on 8051 interrupts using embedded C.			
03	**8051 interrupts programming in C:** 3.1 8051 interrupts 3.2 Programming of timer interrupts 3.3 Programming of Serial communication interrupts 3.4 Programming of External hardware interrupts in C.	12	16
	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 II

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
EIF402-4 Interface and program for various I/O devices(sensors, displays, RTC etc) with 8051 microcontroller.			
04	**LCD, keyboard, ADC, DAC and Interfacing to 8051:** 4.1 LCD interfacing, keyboard interfacing and their Programming in C 4.2 Parallel(ADC0804,ADC0808/09) and serial(MAX1112) ADC interfacing and their programming in C, DAC(DAC0808) interfacing and programming in C 4.3 Temperature sensor(LM35) interfacing and signal conditioning and program to read and display temperature reading.	12	16
EIF402-5 Interface and program for various peripheral I/O devices with 8051 microcontroller.			
05	**Motor control and Real time clock(DS12887) interfacing and programming:** 5.1 Stepper motor interfacing 5.2 DC motor interfacing and speed control of DC motor using PWM, its programming in C 5.3 DS12887 RTC interfacing and its programming in C, alarm, SQW and IRQ features of DS12887 chip.	12	16
EIF402-6 Design and implement 8051 microcontroller based systems for real time applications.			
06	**8051 based System Design:** 6.1 Designing 8051 microcontroller based system such as data acquisition system 6.2 Design of sensor interfacing 6.3 Selection of ADC 6.4 Selection of output drivers 6.5 Writing efficient programs using C	08	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.			

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

Topic no.	Name of the Topic	Distribution Of Marks (Level Wise)			Course Outcome	Total Marks
		Remember	Understand	Applications		
1	8051 Programming in C	8	2	0	EIF 402-1	10
2	8051 Timer, Serial port programming in C	8	6	0	EIF 402-2	14
3	8051 interrupts programming in C	8	4	4	EIF 402-3	16
4	LCD, keyboard, ADC, DAC and Interfacing to 8051	8	4	4	EIF 402-4	16
5	Motor control and Real time clock(DS12887) interfacing and programming	8	4	4	EIF 402-5	16
6	8051 based System Design	0	4	4	EIF 402-6	08
				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 :
(Minimum Eight From List)

Practical Exercises and related skills to be developed :

Sr No	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Development and execution of the program in C for sending data on port lines.	• Writing programs using Embedded C of 8051. • Programming using 8051 kit/ any standard compiler.	EIF 402-2,3
2	Development and execution of the program in C for arithmetic operation and time delay.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,3
3	Development and execution of the program in C for input and output operation.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-3
4	Development and execution of the program in C for interface LEDs to particular port.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler.	EIF 502-2,3

Sr No	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
		3. Calculation	
5	Development and execution of the program in C to generate a square wave on port.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	IEF 502-2,3
6	Development and execution of the program for logical operators and data conversion.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler.	EIF 402-1,2
7	Development and execution of the program PWM waveform generation.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,3,4
8	Development and execution of the program to display a message on LCD (16x2).	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,3,4,
9	To write 8051 C program to send data on serial port continuously.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,3
10	Interface Stepper Motor to Microcontroller 8051 and development and execution of the program to run stepper motor using C.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,5
11	Interface ADC to Microcontroller 8051 and development and execution of the program to display digital equivalent of analog input using C	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,4
12	Interface DAC to Microcontroller 8051 and development and execution of the program to generate specified voltage using C.	1. Writing programs using Embedded C of 8051. 2. Programming using 8051 kit/ any standard compiler. 3. Calculation	EIF 402-2,4

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 given criteria.

ii) Progressive Skill Test:

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

Criteria for Progressive Assessment of Practical and Skill Test

Domain	Particulars	Marks out of 50
Cognitive	Technical preparedness for practical	05
Psychomotor	Algorithm /Flowchart	05
	Program/Logic	05
Affective	Discipline and punctuality	05
	Decency and presentation	05
TOTAL		**25**

d) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria

Domain	Particulars	Marks out of 50
Cognitive	Technical Ability	05
	Logical Approach	05
Psychomotor	Approach to problem	10
	Programming skill	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		**50**

Assessment at semester end practical exam as per Pro-forma I

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

4. Lectures cum discussions
5. Regular home assignments
6. Laboratory work

Teaching and Learning resources:

6. Chalk board
7. Video clips
8. PPT Slides
9. Question Bank
10. Charts

6. Reference Books, Internet

REFERENCE MATERIAL :

c) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1	Keneth J. Ayala	The 8051 Microcontroller	PenRam International
2	M.A.Mazidi	The 8051 Microcontroller and Embedded systems	Pearson Edition, Prentice Hall
3	Ajay Deshmukh	Microcontrollers(Theory & Applications)	Tata Mcgraw Hill

d) Websites:

1. www.google.com
2. www.8051.com
3. www.alldatasheet.com

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COURSE ID :

Course Name : INSTRUMENTATION
Course Code : IEF403
Course Abbreviation : FINS

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
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)	------	Oral	
Marks	**20**	**--**	**80**	-----	**25E**	**125**

* Assessment as per pro-forma I E – External Examination

COMPETENCY:

Acquiring skills used for measurement of complicated parameters using different transducers.
Cognitive : Understand and Classify different transducers and use them for proper application.
Psychomotor : Select a transducer and use of proper signal conditioning circuit according to application.
Affective : Attitude of i) Selection ii) accuracy iii) precision v) Differentiation vi) punctuality

COURSE OUTCOMES:

IEF403-1 Differentiate among variety of transducers based on their features.
IEF403-2 Acquire temperature measuring transducers and temperature measuring methods.
IEF403-3 Acquire displacement measuring and level measuring transducers.
IEF403-4 Use of different types of pressure transducer and acquire pressure measuring and flow measuring different transducers.
IEF403-5 Describe different data transmission methods and telemetry systems.
IEF403-6 Develop proper signal conditioning circuit and use proper data acquisition system.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Acquiring skills used for measurement of complicated parameters using different transducers	-	2	2	-	-	-	-	-	-	-	-	-
IEF403-1	-	2	-	-	-	-	-	-	-	-	-	-
IEF403-2	-	2	-	-	-	-	-	-	-	-	1	1
IEF403-3	-	2	3	-	-	-	-	-	-	-	2	2
IEF403-4	-	2	3	-	-	-	-	-	-	-	1	1
IEF403-5	-	2	-	-	-	-	-	-	-	-	1	-
IEF403-6	-	2	-	-	-	-	-	-	-	-	-	-

CONTENT : **Section I**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	IEF403-1 Differentiate among variety of transducers based on their features		
01	**Transducers** 1.1 Introduction 1.2 Characteristics 1.3 Basic requirements 1.4 Classifications: 1.4.1 Electrical / Mechanical 1.4.2 Active / Passive transducers 1.4.3 Analog / Digital transducers 1.4.4 Resistive / inductive / capacitive 1.5 Photo sensitive transducers	08	12
	IEF403-2 Acquire temperature measuring transducers and temperature measuring methods.		
02	**Temperature measurement** 2.1 Introduction 2.2 Temperature scale 2.3 Methods of temperature measurement 2.4 RTD- construction, features, bridge method 2.5 Thermister- construction, features, PTC, NTC, bridge configuration, four lead method 2.6 Thermocouple - construction, bridge method, with amplifier, compensation techniques 2.7 Pyrometers . 2.7.1 Radiation pyrometer- Principle, radiation receiving element 2.7.2 Total radiation pyrometer 2.7.3 Infrared radiation pyrometer 2.7.4 Optical pyrometer	12	14
	IEF403-3 Acquire displacement measuring and level measuring transducers.		
03	**Displacement and Level Measurement** 3.1Transducers for measurement of linear & angular displacement like 3.1.1 LVDT , RVDT 3.1.2 Synchros & potentiometer 3.2 Level measurement using 3.2.1 Capacitive level detector 3.2.2 Resistive method 3.2.3 Inductive method 3.2.4 With gamma rays 3.2.5 Ultrasonic method 3.2.6 Using float.	12	14
TOTAL		32	40

Section-II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
IEF403-4 Use of different types of pressure transducer and acquire pressure measuring and flow measuring different transducers.			
04	**Pressure & Flow measurement** 4.1 Different types of pressure measuring devices 4.1.1 Burdon tube 4.1.2 Bellows and diaphragm 4.1.3 Strain gauge 4.2 Elastic pressure transducers 4.3 Piezoelectric transducers 4.4 Photoelectric pressure transducers 4.5 Introduction, rate of flow 4.6 Turbine meter 4.7 Electro-Magnetic flow meter 4.8 Ultrasonic flow meter 4.9 Hot wire anemometer 4.10 Flow meter using thermistor	12	14
IEF403-5 Use of different types of pressure transducer and acquire pressure measuring and flow measuring different transducers.			
05	**Data Transmission & Telemetry** 5.1 Methods of Data transmission 5.2 Introduction to Telemetry, Block diagram. 5.3 Types of Telemetry system 5.4 Fundamentals of R-F telemetry , 5.5 Methods of Modulation, 5.6 PAM Telemetry, PCM Telemetry 5.7 Transmission channels & media : Wire line, Radio, microwave, Power line carrier 5.8 Applications of Frequency division & Time division multiplexing.	08	12
IEF403-6 Develop proper signal conditioning circuit and use proper data acquisition system.			
06	**Signal conditioning and Data Acquisition System** 6.1 Introduction of Signal conditioning 6.2 Signal conditioning block diagram- AC & DC 6.3 Attenuators 6.4 Amplifiers- Chopped & modulated amplifier, 6.5 RFID sensors,Wireless sensors 6.6 Ratiometric conversion 6.7 Logarithmic compression 6.8 Block diagram of DAS- single channel & multi channel DAS 6.9 Single channel data acquisition system. 6.10 Pre-amplification and filtering 6.11 Multichannel data acquisition system	12	14

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

Section / Topic no.	Name of topic	Distribution of marks				Total marks
		Knowledge	Comprehension	Application	Course outcome	
I/1	Transducers	8	2	2	IEF403-1	12
I/2	Temperature measurement	4	6	4	IEF403-2	14
I/3	Displacement and Level Measurement	8	2	4	IEF403-3	14
II/4	Pressure & Flow measurement	4	2	8	IEF403-4	14
II/5	Telemetry system & transmitters	4	4	4	IEF403-5	12
II/6	Signal conditioning and Data Acquisition System	6	2	6	IEF403-6	14
				TOTAL		80

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

Laboratory experiments and related skills to be developed : (Minimum Eight practical's from List)

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	To plot the characteristics of thermocouple	1. Connect power supply 2. Know the front panel 3. Plot the characteristics of thermocouple	IEF403-2
2.	To plot the characteristics of RTD	1. Connect power supply 2. Know the front panel 3. Plot the characteristics of RTD	IEF403-2
3.	To plot the characteristics of thermistor	1. Connect power supply 2. Know the front panel 3. Plot the characteristics of Thermistor	IEF403-2
4.	To measure displacement using LVDT	1. Connect power supply 2. Know the front panel 3. Plot the graph of actual displacement v/s reading obtained 4. Comment on the linearity	IEF403-3
5.	Study of diaphragm/Bellow/Burdon tube	1.Identify and know about diaphragm, bellows and Burdon tube 2. Measure pressure using these transducers	IEF403-4
6.	To measure weight using strain gauge pressure transducer	1. Connect power supply 2. Know the front panel 3. Plot the graph of actual weight v/s reading obtained	IEF403-4
7.	Ultrasonic transducer	1.Connect power supply 2. Know the front panel 3. Measure the distance	IEF403-4
8.	Study of flow measurement	1. Connect power supply 2. Know the front panel 3. Measure the flow	IEF403-4

9.	Study of angular velocity measurement	1. Connect power supply 2. Know the front panel 3. Measure the angular velocity	IEF403-5

C) Industrial Exposure

Sr. No.	Mode of Exposure (Visit/Exp.Lect/Ind.Survey/…)	Topic
1.	Field applications in theory lectures in every topic	All topics in course syllabus
2.	Practical exercise on overview of field applications of instrumentation	Part of term work

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 .

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 & complETF 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 oral exam :

Every student shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Preparedness for oral	10
2	Conceptual understanding	10
3	Logical Approach	05
	Total	25

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Rangan, Mani, Sharma	Electronic Instrumentation	Tata McGraw-Hill Ltd., New Delhi
2.	S. K. Singh	Industrial Instrumentation & Control	Tata McGraw-Hill Ltd., New Delhi
3	A.L.Helfrick & W.D. Cooper	Electronic Instruments & Measurements Techniques	Dorling Kindersly Pvt. Ltd. India
4	A. K. Sawaney.	Electrical & Electronics Measurement & Instrumentation	Dhanpat Rai Publications
5	Oliver & cage	Electronic Measurements & Instrumention	Tata McGraw-Hill Ltd., New Delhi
6	Kalsi	Electronic Instruments	Tata McGraw-Hill Education

b) Websites

1) www.ignou.ac.in/upload/Unit-10-62.
2) www.nptel.ac.in/courses/108105063.
3) www.britannica.com/EBchecked/topic/585928
4) www2.l-3com.com/tw/telemetry_tutorial/r_data_acquisition.

COURSE ID:

Course Name :PRINCIPALS OF CONTROL SYSTEM
Course Code :EIF 404
Course Abbreviation :FPCS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
Details of Evaluation	Average of two tests of 20 marks each	iii. 25 marks for each practical iv. One PST of 25 marks	Term End Theory Exam (03 hours)	------	Oral	
Marks	**20**	**--**	**80**	-----	**25I**	**125**

I-Internal Assessment * Assessment as per Pro-forma II

RATIONALE:

Control is the process of causing a system variable to take some desired value, known as reference value. A control system consists of several elements or components connected and operated in such a way as to achieve a desired control in a specific domain of operation of the system The development of technology has seen a wide range use of automatic control system to improve the quantity and quality of manufactured products in many domestic, industrial and defense applications.

To increase the effectiveness, efficiency and quality of products, now a days it is very much essential to complete the required work or task automatically in every field. Control systems are also used in space technology and defense applications such as nuclear power weapons, guided missiles etc. Robots are also created by using automatic control systems. As the control system is the basis of various automatic control systems, therefore the students of electronic engineering must have the knowledge of control system.

COMPETENCY:

Apply control systems in real time.

Cognitive: Understand applications of control systems.

Psychomotor: . Draw block diagrams of control systems as per application

Affective: Attitude of i) Logic ii) accuracy

COURSE OUTCOMES:

EIF 404-1..Identify various types of control systems
EIF 404-2 Predict transient and steady state responses of system.
EIF 404-3..Draw frequency response of system using bode plot
EIF 404-4 Determine stability conditions of control system.
EIF 404-5..Identify use of servo motors as per requirement.
EIF 404-6: Select appropriate Control system processes as necessary.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Apply control systems in real time	-	3	3	1	-	-	-	1	-	-	-	-
EIF 404-1	2	1	-	-	-	-	-	-	-	-	-	-
EIF 404-2	1	2	1	-	-	-	-	1	-	-	-	-
EIF 404-3	1	2	2	1	-	-	-	1	-	-	-	-
EIF 404-4	1	2	2	1	-	-	-	1	-	-	-	2
EIF 404-5	1	2	1	-	-	-	-	1	-	1	-	2
EIF 404-6	1	2	2	2	-	-	-	1	-	1	-	1

CONTENTS:

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIF 404-1.Identify various types of control systems		
1	***COURSE OUTCOME EIF 404-1****.Identify various types of control systems* **Overview of Control system** 1.1 System- definition & practical examples, Control system – definition and examples 1.2 Classification of control system 1.3 Open loop & closed loop systems – definition, block diagram, practical example & Comparison 1.4 Laplace transform – Significance in control system 1.5 Transfer function – definition, derivation of transfer function for close loop control system. 1.6 Order of a system – definition, 0^{th}, 1^{st} ,2^{nd}order system standard equation, practical examples. 1.7 Linear time varying and time in varying systems – definition and example 1.8 Developing differential equations of R-C and RLC electric circuits-simple numerical for finding transfer function of electrical network 1.9 Block diagram representation of a system- need, reduction rules, problems (only SISO).	10	14
	EIF 404-2 Predict transient and steady state responses of system.		
2.	**Time Domain Analysis** 2.1 Time domain and frequency domain analysis-definition 2.2 Transient and steady state response, steady state error-definition and equation only. 2.3 Standard test inputs - step, ramp, parabolic& impulse. Need of them, significance, and corresponding Laplace representation 2.4 Poles, zeros & characteristics equation – definition 2.5 Types of feedback control system: type 0 system, type1 system andtype2 system-only definition 2.6 Analysis of first order control system for unit step input. 2.7 Analysis of second order control system for unit step input.	12	14

	2.8 time response specifications (no derivations) ; problems on time response specification		
EIF 404-3.Draw frequency response of system using bode plot			
3	**Frequency domain Analysis** 3.1 Introduction, advantages & disadvantages of frequency response analysis 3.2 Frequency response specifications 3.3 Correlation between time and frequency domain specifications, 3.4 Bode plot-introduction, 3.4.1. General procedure for constructing Bode plot 3.4.2 Plotting gain margin & phase margin 3.4.3 Simple numericals (max. up to 2-poles)	10	12
	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.			

Sr. No.	**Topics / Sub-topics**	**Lectures (Hours)**	**Theory Evaluation (Marks)**
EIF 404-4Determine stability conditions of control system.			
4	**Stability** 4.1 S-plane – Introduction 4.2 Definition of stability 4.3 Necessary Conditions for stability 4.4 Types of stability:- stable, unstable, critically stable & conditionally stable system; relative stability; 4.5 Root locations in S-plane for stable unstable & critically stable systems 4.6 Routh's stability criterion-different cases& conditions & numericals 4.7 Root Locus technique-Introduction and steps to draw root locus.	10	14
EIF 404-5.Identify use of servo motors as per requirement			
5	**Servo Systems** 5.1 Servo system –definition, block diagram, 5.2 AC & DC servo systems- comparison, practical example, schematic diagram , concept and principle 5.3 Servo components: 5.3.1 Potentiometer as error detector 5.3.2 Synchro as error detector 5.3.3 Rotary encoder 5.3.4 Stepper motor- variable reluctance type, comparison of stepper motor with DC servo motor	12	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.4 DC servo motor- characteristic, difference from a normal DC motor, comparison between armature controlled andfield controlled DC servo motors(with TF) 5.5 AC servo motor-difference from a normal 2 phase induction motor, characteristic of AC Servo motor (no TF)		
	EIF 404-6Select appropriate Control system processes as necessary.		
6	**Control actions & process controllers** i) Process control system – block diagram , elements ii) Role of controllers in process industry; iii) Control actions: discontinuous & continuous modes; iv) on off controllers: neutral zone v) proportional controllers (offset, proportional band) integral & derivative controllers; vi) composite controllers; PI, PD, PID controllers vii)Control actions of electronic controllers with circuits & equations (with op amp)	10	12
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Overview of Control system	4	4	6	EIF 404-1	14
2	Time domain Analysis of a system	4	4	6	EIF 404-2	14
3	Frequency domain Analysis	4	4	4	EIF 404-3	12
4	Stability	4	4	6	EIF 404-4	14
5	Servo Systems	4	4	6	EIF 404-5	14
6	Control actions & process controllers	4	4	4	EIF 404-6	12
TOTAL		24	24	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.

B) TERM WORK
(Minimum Eight From List)

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratory 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.	DC position control system	1. Analyze the DC Position Control system. 2. Measure input position and output position. 3. Plot the graph of input position versus output position.	EIF 404-5
2.	AC position control system	1. Analyze the AC Position Control system. 2. Measure input position and output position. 3. Plot the graph of input position versus output position.	EIF 404-5
3.	Characteristics of potentiometer as error detector	1. Analyze, understand and construct circuit for potentiometer as error detector. 2. Measure input position and output position. 3. Plot the graph of input position versus output position.	EIF 404-5
4.	Characteristics of synchro as error detector	1. Analyze and understand operation of synchro as error detector. 2. Measure input position and output position. 3. Plot the graph of input position versus output position.	EIF 404-5
5.	Step response of first order R-C circuit	1. Construct first order RC Circuit. 2. Observe the output for step input and measure various parameters. 3. Plot the step response	EIF 404-2

		on graph.	
6.	Step response of R-L-C second order circuit	1. Construct second order RLC Circuit. 2. Observe the output for step input and measure various parameters such as delay time, rise time, etc. 3. Plot the step response on graph.	EIF 404-2
7.	Temperature controller with on-off controller	1. Analyze temperature controller with on-off controller. 2. Observe output for various set points.	EIF 404-6
8.	Temperature controller with PI controller	1. Analyze temperature controller with PI controller. 2. Observe output for various set points.	EIF 404-6
9.	Temperature controller with PID controller.	1.Analyze temperature controller with PID controller 2. Observe output for various set points.	EIF 404-6
10.	Study of bode plot	1. Understand procedure to draw bode plot. 2. Using Matlab, sketch bode plot. 3. Verify theoretical and practical graph and parameters such as GM,PM.	EIF 404-3
11.	Study of root locus	1. Understand procedure to draw root locus. 2. Using Matlab, sketch root locus.	EIF 404-4

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

u) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**25**

ii) Progressive Skill Test :

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

v) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Correct figures / diagrams	10
2	Result table / calculations / graphs	10
3	Presentation	05
	Total	25

Assessment at semester end practical exam as per Pro-forma II

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

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	M. Gopal	Digital Control System	Tata McGraw-Hill
2.	J.J.Nagrath& M. Gopal	Control system Engg.	Tata McGraw-Hill
3.	M.Gopal	Control System	Tata McGraw-Hill
4.	K. Ogata	Modern control Engg.	Tata McGraw-Hill
5.	Kumar	Control systems	Tata McGraw-Hill

b) Websites:

1)www.nptel.ac.in

2)www.electronics-tutorials.ws

3)http://electrical4u.com/controlsystem

*** * ***

COURSE ID :

Course Name : SIMULATION SOFTWARE
Course Code : EIF405
Course Abbreviation : FSIM

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	-	04
Practical	04	

Evaluation Scheme :

Mode of Evaluation	**Progressive Assessment**		Theory Examination	**Term End Examination**		**Total**
	Theory	Practical		Term Work	Practical Exam	
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)	Termwork assessment as per proforma-VI	Practical (3 hours)	
Marks	--	--	--	**25**	**50I**	**75**

*Practical Assessment as per pro-forma V I – Internal Examination
**Termwork assessment as per proforma-VI

RATIONALE :

Today in industry there is extensive use of Computer Aided Design(CAD) packages in engineering applications. For example MATLAB, ORCAD are very powerful mathematical computation and electronic circuit design, simulation, and analysis tools. If an engineering problem can be solved using software tool, it is usually more efficient to use the software tool than to write a program in a computer language to solve the problem. MATLAB is a high level programming language / software tool developed by The Mathworks Inc. USA. MATLAB consists hundreds of commands to do mathematics. You can use graph equations to, solve equations, perform statistical tests. By using SIMULINK tool you can do simulations and modeling.
ORCAD consist three tools for specific purposes. OrCAD Capture provides the simple schematic commands you need to enter, modify and verify the PCB design. Thus you can employ this tool e.g. in designing new analog circuit, in revising a schematic diagram for an existing PCB, or designing a digital block diagram with an HDL module. OrCAD Pspice A/D is advanced simulation solutions for analog and mixed-signal environments. OrCAD Layout is advanced, Rules-Driven PCB design tool for simple to complex printed circuit boards. This subject introduces students to the software tools MATLAB & OrCAD.

COMPETENCY:

Design and simulate various electronic circuits using software tool.

Cognitive : Understand applications of MATLAB and OrCAD tool

Psychomotor : Analyze and simulate electronic circuits

Affective : Attitude of i) Design ii) Test iii) Simulateiv)Debug v) Analyze

COURSE OUTCOMES:

EIF405-1 Understand sub windows in MATLAB
EIF405-2 Illustrate basic mathematics and library functions
EIF405-3 Draw and study communication blockset in simulink
EIF405-4 Introduce OrCAD tools
EIF405-5 Design, Simulate and analyze schematics of electronic circuits
EIF405-6 Outline PCB layout

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Design and simulate various electronic circuits using software tool	-	2	2	2	-	-	-	1	-	2	3	3
EIF 405-1	2	-	2	2	-	-	-	1	-	-	2	2
EIF 405-2	2	-	2	2	-	-	-	1	-	-	2	3
EIF 405-3	1	2	3	3	-	-	-	2	-	2	3	3
EIF 405-4	2	-	1	2	-	-	-	1	-	-	2	2
EIF 405-5	-	2	3	2	-	-	-	2	-	2	3	2
EIF 405-6	-	2	3	2	-	-	-	2	-	2	2	3

CONTENT :

Chapter	**Name of the Topic**
	EIF405-1Understand sub windows in MATLAB
01	**Introduction to MATLAB & SIMULINK** 1.1. Introduction to MATLAB Environment 1.2. Introduction to SIMULINK Environment 1.3. Simulation parameters, development of Model 1.4. M-File Environment 1.5. Basic Analysis on command line Interface.
	EIF405-2Illustrate base mathematics and library functions
02	**MATLAB Programming Basics** 2.1 Data Types 2.2 Base Mathematics 2.3 Plotting functions 2.4 Script File 2.5 Function File 2.6 Different 2D, 3D plotting techniques 2.7 Algorithm development using MATLAB
	EIF405-3Draw and study communication blockset in simulink
03	**Industrial Applications of MATLAB** 3.1 Introduction to Communication BlockSet 3.1.1 Analog Communication 3.1.1.1 Analysis of Frequency Modulation 3.1.1.2 Analysis of Amplitude Modulation 3.1.1.3 Analysis of Phase Modulation 3.1.2 Digital Communication 3.2 Transfer function representation- CT,DT
	EIF405-4Introduce OrCAD tools
04	**Introduction TO OrCAD** 4.1 Introduction to OrCAD tools - OrCAD Capture, OrCAD PSpice, OrCAD, Layout 4.2 Features of OrCAD tools
	EIF405-5Design schematics of electronic circuits
05	**OrCAD Capture** 5.1 Use of Capture in Schematic Development. 5.2 Modification, Editing of different parts. 5.3 Study of properties. 5.4 Schematic development.
	EIF405-6Simulate and analyze electronic circuits
06	**OrCAD Pspice** 6.1 Different Simulation techniques 6.2 Transient Analysis - OpAmp Circuitry

	6.6.1 Bias Point Analysis - Resistive Circuitry 6.6.2 A/C Sweep - Frequency Response 6.6.3 D/C Sweep - Transistor Analysis
EIF 509-1405-7Outline PCB layout	
07	**OrCAD Layout** 7.1 Clean Room Standards. 7.2 Basics of PCB layers. 7.3 Component Routing -Auto Routing & Manual Routing. 7.4 Post Processing Techniques.

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

(Minimum Eight From List)

Laboratory experiments and related skills to be developed :

Sr. No	**Laboratory experience**	**Skills developed**	**Course outcomes**
1.	Introduction to MATLAB IDE	1) Students will able to know different tools of MATLAB 2) Students will able to know M-File, Simulink, Toolbox IDEs	EIF405-**1**
2.	Using MATLAB Command line window	1) Students will able to know executing different basic MATLAB commands -I/O, Arithmetic, algebraic etc 2) Students will able to know managing variables, solving, equations, understanding Vectors and Matrices 3) Students will able to access Online Help from Command line 4) Students will able to know - Graphics commands	EIF405-**1,** EIF405-**2**
3.	Study of Base Mathematics in MATLAB	1)Verify simple mathematical operations of all elements in row/column vector. using MATLAB a. Sum b. Mean c. Length d. Max e. Min f. Prod g. Sign h. Round i. Sort j. Fix	EIF405-**2**

4.	Matrix Operations	1)Use of commands to a. Find the deterrminant, inverse & transpose of the given 2X2 matrix b. Evaluate the mathematical operation using matrix	EIF405-**2**
5.	Study of Plotting functions	1) Students will able to know to plot in MATLAB	EIF405-**3**
6.	Study of file handling & string manipulation (any two each)	1) Students will be able to use file handling and string manipulation	EIF405-**3**
7.	Looping & Branching instructions (any two each)	Students will be able to use looping and branching instruction	EIF405-**1,** EIF405-**2,** EIF405-**3**
8.	Introduction to Communication BlockSet	1) Students will able to know what is Blockset 2) Students will able to know communication blockset various blocks 3) Students will able to use various blocks	EIF405-**3**
9.	Analysis of Amplitude Modulation	1) Students will able to know to do analysis in MATLAB	EIF405-**3**
10	Analysis of Frequency Modulation	1) Students will able to know to do analysis in MATLAB	EIF405-**3**
11	Introduction to OrCAD tools - OrCAD Capture, OrCAD PSpice, OrCAD Layout	1) Students will able to know various tools of OrCAD	EIF405-**4**
12	Designing circuit using OrCAD Capture-Rectifiers, Filters, Amplifiers -Oscillators, Multivibrators	1) Students will able to know to design simple electroniccircuits using OrCAD tool Capture	EIF405-**4,** EIF405-**5**
13	Analysis of above electronic circuits using OrCAD Pspice	1) Students will able to know to Analyze simple electroniccircuits designed using OrCAD tool Capture	EIF405-**6**
14	PCB Layout designing of of above electronic circuits using OrCAD Layout	1) Students will able to know to design PCB layout of simple electronic circuits designed using OrCAD tool Layout	EIF405-**7**

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 .

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.	Attendance at regular practical	5
2.	Preparedness for practical	10
3.	Correct figures / diagrams	10
4.	Observation tables	10
5.	Result table / calculations / graphs	10
6.	Safety / use of proper tools	5
	Total	50

b) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 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 diagram	10
3	Logical approach	10
4	Program/coding	10
5	Result	10
	Total	50

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Delores M. Etter, David C. Kuncicky, Doug Hull	Introduction to MatlabR 6	Second Edition PEARSON Education Low Price Edition
2.	Rudra Pratap	Getting Started With Matlab7	Oxford University Press, Incorporated, 2006
3	Brian R. Hunt , Ronald L. Lipsman, Jonathan M. Rosenberg	A guide to MATLAB For Beginners and Experienced Users	Cambridge University Press
4	M. H. Rashid	Introduction to P-spice using OrCAD for circuits and Electronics	Pearson Education

b) Websites

1)http://www.mathworks.in/
2)www.scilab.org/
3) www.cadence.com/products/orcad

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COURSE ID :

Course Name : ELECTRONIC CIRCUIT DESIGN
Course Code : EIF 406
Course Abbreviation : FECD

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	**Progressive Assessment**		Theory Examination	**Term End Examination**		**Total**
	Theory	Practical		Term Work	Practical Exam	
Details of Evaluation	Average of Two tests (1hour each)	i. 25 marks for each practical ii. One PST of 25 marks	Term End Theory Exam (03 hours)		One Oral	
Marks	20	--	**80**	--	**25I**	**125**

** Assessment as per Pro-forma II. I– Internal Examination

RATIONALE :

Though Diploma holders are not design engineers, they must have some basic knowledge of circuit design. Electronic circuits are widely used in industries, communication, etc. This subject will help a student to maintain these various circuits and also for development of his career as a design Engineer.

COMPETENCY:

Design and build electronic circuit for different engineering applications.

Cognitive : Understanding specification of electronics component.

Psychomotor :design electronic circuits for different applications.

Affective : Attitude of i) Design ii) Test iii) Diagnoseiv)Analyze v) Formulate

COURSE OUTCOMES:

EIF 406-1 Identify specification of different electronics component.

EIF 406-2 Design power supply as per requirement

EIF 406-3 Design small signal amplifier.

EIF 406-4 Differentiate and design power amplifier

EIF 406-5 Classify and formulate oscillators

EIF 406-6 Differentiate and design multivibrator

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Design electronic circuit for different engineering applications	-	1	3	-	1	-	-	2	-	-	3	3
EIF 406-1	1	-	1	-	-	-	-	-	-	-	1	1
EIF 406-2	-	2	2	-	1	-	-	2	-	-	3	3
EIF 406-3	-	2	2	-	1	-	-	2	-	-	3	2
EIF 406-4	-	2	2	-	1	-	-	2	-	-	2	2
EIF 406- 5	-	2	2	-	1	-	-	2	-	-	3	2
EIF 406-6	-	2	2	-	1	-	-	2	-	-	3	2

CONTENT :

A) THEORY : Section I

Sr. No.	TOPIC/ SUB TOPIC	Teaching (Hours)	Theory evaluation Marks
	EIF 406-1 Identify specification of different electronics component		
01	**Electronics Components and Specifications** Specifications of following: 1.1 Transformer Power, Audio frequency, Intermediate frequency, pulse transformer. 1.2 Semiconductor diode 1.3 Zener diode 1.4 Bipolar Junction Transistor 1.5 Field Effect Transistor *1.6* Unipolar Junction Transistor (NUMERICAL BASED ON ABOVE TOPIC)	04	08
	EIF 406-2 Design power supply as per requirement		
02	**Design of Power Supply** 2.1 Design of Center-tapped rectifier with C , L- section , pi filter. 2.2 Design of Bridge rectifier with C , L- section , pi filter. 2.3 Design of Zener shunt regulator. 2.4 Design of Transistor series regulator(emitter follower) 2.5 Design of 723 low and high voltage regulator 2.6 Design of Three terminal regulator-78xx and 79xx. (NUMERICAL BASED ON ABOVE TOPIC)	10	16
	EIF 406-3Design small signal amplifier.		
3	**Design of small signal amplifier.** 3.1 Design of small signal voltage amplifier (CE) 3.2Design of Emitter follower, Darlington Emitter follower. 3.3Types of coupling in multistage amplifiers-Direct Coupling and RC coupling 3.4Design of two stage R-C coupled amplifier 3.5Design of Common-source amplifier 3.6Design of source follower. (NUMERICAL BASED ON ABOVE TOPIC)	10	16
	TOTAL:	**24**	**40**

Section II

EIF 406-4Differentiate and design power amplifier			
04	**Power Amplifier Design** **4.1** Classification of power amplifiers, Efficiency considerations, comparison 4.2 Design of Class A power amplifier with Resistive load 4.3 Design of transformer coupled class A Power amplifier 4.4 Design of Class B Push Pull power Amplifier 4.5 Design of Class AB Push Pull power Amplifier. 4.6 Design of complementary Symmetry Power amplifier	07	12
EIF 406-5 Classify and formulate oscillators			
5	**Design of Oscillators** 5.1 Barkhahusen's Criteria 5.2 Design of R-C phase shift oscillator using BJT and Op-amp 5.3 Design of Wien bridge oscillator using BJT and Op-amp 5.4 Design of Colpitt's oscillators using 5.5 Design of Hartley oscillator using BJT and Op-amp	10	16
EIF 406-6 Differentiate and design multivibrator			
06	**Design of Multivibrators** 6.1 Design of Astablemultivibrator using IC 555 and Op-amp 6.2 Design of Monostablemultivibrator Using IC 555 and Op-amp. 6.3 Design of Bistable multivibrator using IC 555. (NUMERICAL BASED ON ABOVE TOPIC)	07	12
	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.			

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

Topic No.	Name of Topic	Distribution of Marks (Level wise)			Course Outcomes	Total Marks
		Knowledge	Comprehension	Application		
1.	Electronics Components and Specifications	04	04	00	EIF 406-1	08
2.	Design of power Supply	04	04	08	EIF 406-2	16
3.	Design of small signal amplifier	04	04	08	EIF 406-3	16
4.	Power Amplifier design	02	02	08	EIF 406-4	12
5.	Design of Oscillators	04	04	08	EIF 406- 5	16
6.	Design of Multivibrators	02	02	08	EIF 406-6	12
				Total		80

B) **TERM WORK** Term work shall consist of the following :
(Minimum Eight From List)

Laboratory experiments and related skills to be developed :

Sr.no	**Laboratory experiments**	**Skills Developed**	**Course Outcomes**
1	Study of colour coding of resistor, capacitor, inductor and specification of diode ,BJT , FET, OPAMP	Study specification of diode ,BJT , FET, OPAMP. DETFrmine values of resistor, capacitor, Inductor using colour coding.	EIF 406-1
2	Full wave rectifier design with filter with given specifications.	Design bridge rectifier with capacitor filter and test it on breadboard	EIF 406-2
3	Design of zener regulator with given specifications.	Design Zener regulator with specific requirements and test it on breadboard	EIF 406-2
4	Design of transistorised series regulator with given specifications.	Design circuit with given specification and test it . Do fault finding if required	EIF 406-2
5	Design of 723 regulator.	Design Low and High voltage regulator using IC 723 and test it	EIF 406-2
6	Design of small signal voltage amplifier.	Design BJT/FET amplifier for specific voltage gain and test it	EIF 406-3
7	Design of power amplifier.	Design class B complementary symmetry power amplifier and test it	EIF 406-4
8	Design of LC/RC oscillator	Design any one oscillator circuit for specified frequency and test it	EIF 406-5
9	Design of multivibrator.	Design astable / monostable MV using 741 / 555/ BJT for specific frequency and test it	EIF 406-6
10	Miniproject on different electronics design.	Design, test and find different types of fault in different electronics circuits.	EIF 406-1,2,3,4,5,6

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 .

iii) 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.	Particulars	Marks
1	Attendance	05
2	Correct figures	05
3	Proper Observation & Result Table	05
4	Sample Calculation with relevant Formulae	05
5	Procedure/ Workmanship/ Safety	05
	Total	25

b) Criteria for assessment at semester end oral exam :

Every student shall be assessed as per following criteria

Sr. no	Criteria	Marks allotted
1	Presentation	10
2	Conceptual Understanding	10
3	Confidence and Overall Performance	05
	Total	25

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	N.C.Goyal&R.K.Khetan	A monograph on Electronic Design Principles	Khanna
2.	Millman&Halkias	Electronic Circuits & Devices	McGraw-Hill
3	B. S. Sonde	Power Supplies	Tata McGraw-Hill
4	Mottershad.	Electronic Devices & Circuits	PHI
5	Mantri Jain	Electronic circuit design	Techmax
6	Talbar and Sontakke	Electronic circuit design	Sadhu Sudha Publications,

b) Websites

i. www.electroschematics.com
ii. www.discovercircuits.com
iii. www.allaboutcircuits.com
iv. www.learningcircuits.co.uk

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COURSE ID:

Course Name : DIGITAL SYSTEM DESIGN
Course Code : IEF 407
Course Abbreviation : FDSD

TEACHING AND EVALUATION SCHEME:

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

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Theory Examination	Term End Examination		Total
	Theory	Practical		Term Work	Practical Exam	
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)	--	Oral	
Marks	**20**	**--**	**80**	--	**25I**	**125**

*Assessment as per Pro-forma II. I-Internal Examination

RATIONALE:

In order to gain knowledge of system design, this subject has been introduced. Digital systems are widely used in every field of electronics like VLSI, signal processing, communication, etc. This subject will help a student to design the basic digital systems and develop their career as a design Engineer.

COMPETENCY:
Design and Build digital systems for different engineering applications.
Cognitive : Understandingdesign Concept of basic digital system
Psychomotor : Writeprogramming code in VHDL and design small digital system .
Affective : Attitude of i)Design ii) test iii) Logicv)analyze
COURSE OUTCOMES:

IEF407-1develop logic for desining combinatonal logic circuit.
IEF407-2 Identify/Discover the architectural details of 8051 microcontroller and illustrate its functioning.
IEF407-3 Use instructions from the instruction set of 8051 to write basic assembly language programs to develop logic.
IEF407-4 Explore programming skills for I/O ports, Timers/Counters and interrupts of 8051.
IEF407-5 Design interfacing of I/O devices with 8051 and write programs for it.
IEF407-6 Develop 8051 microcontroller based systems for various 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Build 8051 microcontroller based systems for engineering applications	-	3	3	2	-	-	-	2	-	-	3	3
IEF407-1	-	3	3	-	-	-	-	1	-	-	2	1
IEF407-2	-	3	1	-	-	-	-	1	-	-	2	1
IEF407-3	-	3	3	2	-	-	-	2	-	-	3	2
IEF407-4	-	3	3	3	-	-	-	2	-	-	3	3
IEF407-5	-	3	3	3	-	-	-	2	-	-	3	3
IEF407-6	-	3	3	3	-	-	-	2	-	-	3	3

CONTENT:

A) THEORY : Section-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Marks
	IEF407-1 develop logic for desining combinatonal logic circuit.		
01	**Combinational Logic Design** 1.1 Standard representations of logic functions. 1.2 K-map representations of logic functions, (SOP & POS forms). 1.3 Minimization of logical functions for minterms and maxterms (upto 4 variables). 1.4 Don't care conditions. 1.5 Design examples: Arithmetic circuits, BCD- to- 7segment decoder, code converters. 1.6 Quine Mc-Cluskey methods, Adders and their use as subtractors, Look ahead carry. 1.7 ALU, Digital comparator, Parity generators/checkers. 1.8 Static and dynamic hazards for combinational logic. 1.9 Multiplexers and their use in combinational logicdesign. 1.10 Multiplexer trees, Demultiplexers and their use in combinational logic designs, Decoders, demultiplexer trees.	10	14
IEF407-2 Identify/Discover the architectural details of 8051 microcontroller and illustrate its functioning.			
02	**Sequential Logic Design** 2.1 Bit memory cell, Clocked S-R, J-K, MS J-K flip flop,D and T flip flop. 2.2 Use of preset and clear terminals. 2.3 Excitation table for flip flops, Conversion of flipflops. 2.4 Application of flip flops: Registers, Shift registers, counters, (Ring counters, twisted ring counters). 2.5 Sequence generators, Ripple counters. 2.6 Up/down counters, Synchronous counters, Lock out, 2.7 Clock skew, Clock jitter. 2.8 Effects on synchronous design.	8	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Marks
IEF407-3 Use instructions from the instruction set of 8051 to write basic assembly language programs to develop logic.			
03	**Introduction to HDLs** 3.1 Library, Entity, Architecture, 3.2 Modeling styles, Data objects 3.3 Concurrent and sequential statements. 3.4 Design examples using VHDLfor basic combinational and sequential circuits. 3.5 Attributes(for practical) (Test benches and FSM excluded).	6	12
	TOTAL	24	40
Section-II ***IEF407-4 Explore programming skills for I/O ports, Timers/Counters and interrupts of 8051.***			
04	**State Machines** 4.1 Basic design steps-State diagram. 4.2 state table, State reduction, State assignment. 4.3 Mealy and Moore machine representations,Implementation. 4.4 Finite state machine implementation. 4.5 Sequence dETFctor design. 4.6 Introduction to algorithmic state machine.	8	16
IEF407-5 Design interfacing of I/O devices with 8051 and write programs for it.			
05	**Programmable Logic Devices and Semiconductor memories** 5.1 Programmable Logic Devices: Detail architecture, 5.2 Study of PROM, PAL, PLA. 5.3 DesigningCombinational circuits using PLDs. 5.4 Semiconductor memories: Memory organizationoperation, Expanding memory size. 5.5 Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM. 5.6 Expanding memory size, Synchronous DRAM(SDRAM), 5.7 Double data rate SDRAM. 5.8 Synchronous SRAM, DDR and QDR SRAM, Content addressable memory.	10	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Marks
IEF407-6 Develop 8051 microcontroller based systems for various applications.			
06	**System Design** 6.1 Designing microcontroller based system such as data acquisition system. 6.2 Design of sensor interfacing. 6.3 Selection of ADC and output drivers. 6.4 Writing efficient programs using assembly language or C.	06	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

A) TERM WORK

Practical Experiment and related skills to be developed: (Minimum Eight practical's from List)

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 Experiment	Skills / Competencies to be developed	Course outcome
1.	Design and implement combinational function using MUX and DEMUX ICs.	Information search and interpretation skills	IEF407-1
2.	Design and implement single digit BCD adder using binary adder IC.	Information search and interpretation skills	IEF407-1
3.	Functional verification of ripple counter IC and synchronous counter IC (MODN operation) N should be 2 digits.	Information search and interpretation skills	IEF407-2
4.	Functional verification of shift register IC and implementation of pulse train generator using the above IC. Observe the output using logic analyzer.	Information search and interpretation skills	IEF407-2
5.	Two bits digital comparator.	Information search and interpretation skills	IEF407-2, IEF407-3
6.	Four bit ALU for minimum four arithmetic and Logical operations.	Information search and interpretation skills	IEF407-2, IEF407-3
7.	D f/f and JK f/f (using synchronous and asynchronous reset inputs).	Information search and interpretation skills	IEF407-2
8.	Four bits UP ripple counter using mode control.	Self-testing skills	IEF407-2, IEF407-3, IEF407-4

9.	Four bits DOWN ripple counter using mode control.	Self-testing skills	IEF407-2, IEF407-3, IEF407-4
10.	Practical Oriented Miniproject .	Self-testing skills	IEF407-6

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

ii) Progressive Skill Test:

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

Criteria for Progressive Assessment of Practical and Skill Test

Particulars	Marks
1) Attendance	05
2) correct figures	05
3)Proper Observation & Result Table	05
4)Sample Calculation with relevant Formulae	05
6)Procedure/ Workmanship/ Safety	05
Total	25

b) Criteria for assessment at semester end oral exam:

Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
3	Logical approach	10
4	Program/coding	10
5	Result	05
	Total	25

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

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
01	R. P. Jain	Modern Digital Electronics	Tata Mcgraw Hill
02	Pedroni	Circuit design with VHDL	
03	Stephen Brown	Fundamentals of digital logic design with VHDL	Tata Mcgraw Hill
04	John Walkerly	Digital Design Principles and practices	Pearson Education

b) Websites

*en.wikipedia.org/wiki/**Digital**_electronics*

COURSE ID :

Course Name : DATA COMMUNICATION SYSTEM
Course Code : IEF408
Course Abbreviation : FACS

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <nil>

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination		Total
	Theory	Practical	Theory Examination	Practical / Oral / Term Work	
Details of Evaluation	Average of two tests of 20 marks each	iii. 25 marks for each practical iv. One PST of 25 marks*	Term End Theory Exam (03 hours)	Oral	
Marks	**20**	**--**	**80**	**25I***	**125**

I-Internal Assessment * Assessment as per Pro-forma II

RATIONALE :

Digital communication systems are becoming increasingly attractive because of ever-growing demand for data communication. Digital transmission offers data processing option and flexibility not available with analog transmission. This is technology group subject, which will enable student to comprehend facts, concepts & working principle of data communication system. This subject familiarizes the student with information theory, measurement of information rate &capacity. This subject helps the student to understand the concept of various pulse modulations, Digital modulation techniques, coding methods and error control. The students will also get exposure to introductory knowledge of network types, topologies and switching techniques. The knowledge acquired by students will help them to apply it in various modern communication systems.

COMPETENCY

Recognize and collect detail knowledge about digital communication systems.

Cognitive : Acquire basic knowledge of digital communication concepts**.**
Psychomotor : Discover different modulation techniques practically.
Affective : Proficiency in knowledge of digitization and communication of signal.

COURSE OUTCOMES :

IEF408-1 Acquire knowledge of various concepts in digital communication system.
IEF408-2 Distinguish different pulse modulation techniques.
IEF408-3 Differentiate and discover knowledge of digital modulations.
IEF408-4 Control the errors by understanding various coding methods.
IEF408-5 Identify/Discover the architectural details of different topologies and models of network and illustrate its functioning based on connecting devices.
IEF408-6 Identify different switching techniques and explore their 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: Recognize and collect detail knowledge about digital communication system.	2	3	3	2	-	-	-	-	-	-	-	2
IEF408-1	2	3	-	-	-	-	-	-	-	-	-	-
IEF408-2	-	3	2	2	-	-	-	-	-	-	-	-
IEF408-3	-	3	3	2	-	-	-	-	-	-	-	-
IEF408-4	-	3	3	2	-	-	-	-	-	-	-	2
IEF408-5	-	3	3	2	-	-	-	2	-	1	-	1
IEF408-6	-	1	2	1	-	-	-	-	-	1	-	-

CONTENT :

C) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEF408-1 Acquire knowledge of various concepts in digital communication system.			
1	**Introduction of Digital Communication** 1.1 Basic digital communication system(block diagram and function of each block) 1.2 Channel capacity-definition ,equation 1.3 Shannon-Hartley theorem 1.4 channel noise and its effect 1.5 Entropy (definition and equation) 1.6 Advantages and disadvantages of digital communication ,Comparison between analog and digital communication	4	8
IEF408-2 Distinguish different pulse modulation techniques.			
2.	**Pulse Communication** 2.1 Introduction, comparison with Continuous Wave Modulation, advantages 2.2 Sampling: sampling theorem, Nyquist rate, aliasing, natural & flat top. 2.3 PAM, PWM, PPM (definition, generation, block diagram, waveform analysis, and their comparison.) 2.4 Pulse code modulation- block diagram of PCM transmitter & receiver, 2.5 Quantization, quantization error 2.6 Companding, 2.7 Inter symbol interference 2.8 Delta modulation- block diagram of DM, slope overload, granular noise. 2.9 ADM, DPCM, block diagram and its working.	10	16
IEF408-3 Differentiate and discover knowledge of digital modulations.			
3	**Digital Modulation Techniques** Definition & waveforms, their transmitter and receiver block diagram and working for following types: 3.1 ASK:BASK, QAM 3.2FSK:BFSK,MFSK 3.3 PSK:BPSK,QPSK,MPSK 3.4 Bandwidth, spectrum for each modulation technique and their comparison.	10	16
	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.

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	IEF408-4 Control the errors by understanding various coding methods.		
4	**Coding methods and Error control** 4.1 Baud rate, Bit rate. 4.2 Line coding - unipolar, bipolar – NRZ, RZ, Manchesterd 4.3 Source coding,shannon fano coding ,Huffman coding. 4.4 Channel coding: Error, Causes of error and its effects, error detection& correction using parity, Hamming code & CRC code simple numerical. 4.5 Comparison between different coding	08	12
	IEF408-5 Identify/Discover the architectural details of different topologies and models of network and illustrate its functioning based on connecting devices.		
5	**Introduction To Networking** 2.1 Network definition & criteria (performance, reliability, security) 2.2 Type of connection - Point to point, multipoint 2.3 Network topology: Mesh, ring, bus, star, hybrid 2.4 Types Of Networks :LAN,WAN and MAN, Internet and internet service providers 2.5 Network models – OSI, TCP/IP(Organization and Functions Of each layer) 2.6 Levels (Types) of addressing – Physical, Logical (IP), Port, and Specific addresses 2.7 Transmission media and types – performance, advantages and applications, 2.8 Modems –block schematic & standards 2.9 Network Devices: Network Connectors, Hubs, Switches, Routers, Bridges	10	14
	IEF408-6 Identify different switching techniques and explore their applications.		
6	**Switching Techniques** 3.1 Connection oriented services (Virtual circuits) and Connectionless services (Datagrams) 3.2 Switching Basics - Circuit Switching; Packet Switching - Datagram approach, Virtual circuit approach; Message Switching 3.3 Frame Relay - Introduction; The need for Frame Relay; 3.4 How Frame Relay works; Frame Relay frame format 3.5 Asynchronous Transfer Mode (ATM) – Introduction, Overview of ATM	06	14
	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.

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Applica--tion		
1	Introduction of Digital Communication	4	-	4	IEF408-1	8
2	Pulse Communication	4	6	6	IEF408-2	16
3	Digital Modulation Techniques	4	6	6	IEF408-3	16
4	Coding methods and Error control	4	4	4	IEF408-4	12
5	Introduction to networking	6	4	4	IEF408-5	14
6	Switching Techniques	6	4	4	IEF408-6	14
TOTAL		28	24	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.

D) TERM WORK

Practical Exercises and related skills to be developed: (Minimum Eight practical's from List)

The following practical exercises (any Ten) shall be conducted as Term Work as detailed in the *Laboratory Manual for Data Communication Systems* developed by the Institute in practical sessions of batches of about 20 students:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Pulse Amplitude modulation	1) Understand pulse amplitude modulation 2) Understand sampling 3) Analyze the modulated waveforms	IEF408-2
2.	Pulse width modulation	1) Understand pulse width modulation 2) Make connections on kit 3) Analyze the modulated waveforms	IEF408-2
3.	Pulse Position modulation	1) Understand pulse Position modulation 2) Make connections on kit 3) Analyze the modulated waveforms	IEF408-2
4.	Pulse code modulation and demodulation.	1) Understand pulse code modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	IEF408-2
5.	Delta modulation.	1) Understand Delta modulation	IEF408-3

		2) Make connections on kit 3) Analyze the modulated waveforms	
6.	Adaptive delta Modulation.	1) Understand Adaptive Delta modulation 2) Make connections on kit 3) Analyze the modulated waveforms	IEF408-3
7.	ASK modulation & demodulation.	1) Understand ASK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	IEF408-3
8.	FSK modulation & demodulation.	1) Understand FSK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	IEF408-3
9.	PSK modulation & demodulation.	1) Understand PSK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	IEF408-3
10.	QPSK modulation & demodulation.	1) Understand QPSK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	IEF408-3
11.	Types of networks	Understand and compare various types of networks and topologies with diagram.	IEF408-5
12.	Physical Layer network components	Describe Physical Layer network components such as Network Connectors, Hubs, Switches, Routers, Bridges(Types of Bridges) and identify network components in given network.	IEF408-5
13.	Types of transmission media	Describe different types of transmission media and list their properties.	IEF408-5
14.	Troubleshooting of network	Know the procedure of network troubleshooting and identify the faults in the network.	IEF408-5, 6

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

w) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 VI.*

x) Criteria for assessment at semester end Oral exam:
Every student has shall be assessed as per following criteria.

Sr. No.	Particulars	Marks
1	Attendance	02
2	Question and Answer	20
3	Decency and presentation	03
	Total	25

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

REFERENCE MATERIAL :
a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Sanjay Sharma	Digital Communication	S.K.Kataria and sons
2.	Wayne Tomasi	Electronic communication system	Pearson
3	R.P.Singh,S.D.Sapre	Communication Systems	Tata Mcgraw hill
4	Achyut S. Godbole	Data Communication & Networking	Tata McGraw-Hill Edition
5	B.A. Forouzan	Data Communication & Networking	Tata McGraw-Hill Edition(4th Edition)

b) Websites:

1. www.pearsoned.co.in/waynetomasi
2. www.skkatariaandsons.com
3. www.nptel.ac.in
4. www.tutorialspoint.com/**data_communication**_computer_**network**/
5. *www.freevideolectures.com>Networking>IIT Kharagpur*

LEVEL -V
MANAGEMENT AND DIVERSIFIED COURSES

COURSE ID :

Course Name : POWER ELECTRONICS-II
Course Code : IEF
Course Abbreviation : FPE 2

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIF401Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	4	06
Practical/T.W.	2	

Evaluation:

Mode of evaluation	Progressive Assessment		Semester end		Total
	Theory	Practical	Theory Examination	Term Work	
Details of evaluation	Two tests (1hour each)	i. 25 marks for each practical ii. One PST of 25 marks*	Term End Theory Exam (03 hours)	As per Proforma-I	
Marks	20 each	-	80	50E	150

Assessment as per Pro-forma I E-External examination

Rationale: Over the years the design and construction of electronic devicesand circuits have changed dramatically. The needs of the technician and experimenter have also changed over the years. In order to construct industrial circuits, engineer has to have a firm grasp of the fundamentals of power electronics. The background required is familiarity with basic power electronic concepts. Industrial electronics aspect is introduced to cater specifically the needs of students of Industrial Electronics power transformation. This subject is important link between basic electricity and advanced electronic applications .This subject shall provide firm foundation for many industrial applications and processes.

COMPETENCY:

Analyze various power electronic devices and power converters for various applications
Cognitive : Understand power electronics DC Drives, devices and its firing circuits.
Psychomotor : Design, model, build and test the operation of simple power electronic circuits in a lab environment
Affective : Attitude of i) logic ii) accuracy iii) design skills v) creativity.

COURSE OUTCOMES:

IEF 501-1 Use of fast switching devices based on their control facility in industrial aspects.
IEF 501-2 Identify various types of power conversion techniques in real life application.
IEF 501-3 Select proper material in industry by analysis of its working of various line converters and SMPS
IEF 501-4 Use Inverters with multidisciplinary factors to solve industrial problems.
IEF 501-5 Apply basic principle of power electronics and power conversion techniques for various industrial application.
IEF 501-6 Use emerging technologies in power electronics for various industrial 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
	-	3	3	-	-	-	-	-	-	-	3	3
IEF 501-1	-	2	3	-	-	-	-	-	-	-	2	1
IEF 5011-2	-	2	2	-	-	-	-	-	-	-	2	1
IEF 501-3	-	3	3	-	-	-	-	-	-	-	3	2
IEF 501-4	-	3	3	-	-	-	-	-	-	-	3	3
IEF 501-5	-	3	3	-	-	-	-	-	-	-	3	3
IEF 501-6	-	3	3	-	-	-	-	-	-	-	3	3

CONTENT :

A) THEORY : **Section I**

Sr. no.	Topics Subtopics	Teaching Hours	Theory evaluation Marks
	IEF501-1 Use of fast switching devices based on their control facility in industrial aspects		
01	**Non Latching Devices:** 1.1 power MOSFET, IGBT,GTO 1.2 Constructional details, operating principle and characteristics of above. 1.3 Study of above devices with reference to the paramETFrs 1.3.1 Voltage and current rating 1.3.2 Turn on and turn off time 1.3.3 leakage current 1.4 List of applications of above devices	10	12
IEF501- 2 Identify various types of power conversion techniques in real life application.			

02	**Chopper (Dc to dc converter)** 2.1 Basic block diagram, operating principle. 2.2 Classification of choppers on the basis of : 2.2.1 output voltage – step up & step down 2.2.2 Commutation method – series turn off & parallel turn Off 2.2.3 Quadrantof operationsinglequadrant ,two quadrant , four quadrant, Jones chopper Circuit Operating principle , Applications of choppers 2.3 **Cyclo-Converters** 2.3.1 Cycloconverters operation 2.3.2 Single phase to single phase cycloconverter 2.3.3 Single phase to bridge Cycloconverters 2.3.4 Three phase to single phase cycloconverter 2.3.5 Three phase to three phase cycloconverter	12	16
IEF501-3 Select proper material in industry by analysis of its working of various line converters and SMPS			
03	**AC & DC voltage regulator** 3.1 Ac voltage regulator 3.1.1 Need of ac voltage regulator (power line disturbances) 3.1.2 Regulator types : Relay type , servo type , Resonant type, solid state type (tap changing & phase control) 3.1.3 Circuit diagram , operating principle , applications of above types, Specifications 3.2 Switching regulator (SMPS) 3.2.1 Need 3.2.2 Power supply requirements: Regulated output, isolation, multiple outputs ,efficiency,size,weight 3.2.3 Review of linear regulator 3.2.4 SMPS : Block diagram	10	12

Section-II

Sr.	Topics	Teaching	Theory evaluation

no.	Subtopics	Hours	Marks
	IEF501-4 Use Inverters with multidisciplinary factors to solve industrial problems		
04	**DC to AC converter (Inverter)** 4.1 Basic principle of inverter 4.2 Classification on the basis of Energy source – voltage source & current source. Commutation – series & parallel 4.3 Voltage source inverters 4.4.1 Series inverter 4.4.2 Parallel inverter with R & RL load 4.4. Bridge inverter : simple bridge inverter with R load 4.4.1 bridge inverter with Mc Murray Bed Ford commutation, Bridge inverter with Mc Murray commutator. 4.5 Resonant inverters – Zero voltage switching 4.6 PWM Inverter- circuit diagram, waveforms and explanation, Output voltage & harmonics control 4.7 List of applications. 4.8 Specifications.	16	18
	IEF 501-5 Apply basic principle of power electronics and power conversion techniques for various industrial application		
05	**Industrial applications** 5.1 Induction heating 5.5.5 Principle ,theory 5.5.6 Applications –surface hardening,annealing,brazing 5.2 UPS 5.2.1 Need of UPS 5.2 .2Basic block diagram of UPS & operating principle, explanation of rectifier , battery , inverter , static transfer switch 5.2.3 Types of UPS : 5.3.1Off line UPS 5.3.2On line UPS	08	10

	5.3.4 Line interactive UPS & their comparison 5.2.4 UPS specifications – Input voltage range, dc voltage range, transient response, response time, total harmonic distortion,output frequency, output waveform, transient recovery, load power factor & types of protection.		
IEF501-6 Use emerging technologies in power electronics for various industrial applications.			
	Protection circuits 6.1 Need of protection circuits 6.2 Snubber circuits: Their functions, operating principle 6.3 Over current protection & over voltage protection 6.4 Isolation circuits : pulse transformer & optoisolator 6.5 Crowbar protection, current fold back , spike suppressor 6.6 Circuit breaker	08	12

Specification Table For Question Paper of Theory Examination

Sr. No.	Name Of the Topic	Distribution Of Marks (Level Wise)			**Course Outcome**	Total Marks
		Knowledge	Comprehension	Applications		
I/1.	Non Latching Devices:	04	04	04	IEF501-1	12
I/2	Chopper (Dc to dc converter.	04	06	06	IEF501-2	16
I/3	AC & DC voltage regulator	04	04	04	IEF501-3	12
II/1	DC to AC converter(inverter)	08	06	04	IEF501-4	18
II/2	UPS	02	04	04	IEF501-5	10
II/3	Protection circuits	02	04	06	IEF501-6	12
				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 :

Laboratory experiments and related skills to be developed : (Minimum Eight practical's from List)

Sr. No.	Title of the Lab Work	Skills developed	**Course Outcome**

1	Characteristics of power transistor	i)To Analyze principal of operation of power transistor & characteristics of it. ii) To plot the characteristics.	IEF501-1
2	Characteristics of IGBT.	i)To understand principal of operation of IGBT & characteristics of it. ii) To plot the characteristics	IEF501-1
3	Characteristics of MOSFET.	i)To understand principal of operation of MOSFET & characteristics of it ii) To plot the characteristics	IEF501-1
4	Study of snubber circuit	i)To understand principal of operation of protection circuit.	IEF501-6
5	Study of step-up chopper	i)To understand principal of operation of step up chopper.	IEF501-2
6	Study of step-down chopper.	i)To design principal of operation of step down chopper.	IEF501-2
7	Study of series inverter.	i)To understand principal of operation of series inverter.	IEF501-4
8	Study of parallel inverter.	i)To design principal of operation of parallel inverter.	IEF501-4
9	Study of SMPS.	i)To study principal of operation of SMPS.	IEF501-3
10	Study of UPS.	i)To understand principal of operation of UPS.	IEF501-5

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 .

ii) Progressive Skill Test :

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

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

Sr. No.	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Presentation	05
3	Conceptual understanding	05
5	Proper procedure /safety measures	05
6	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 3 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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Deodatta Shingare	Industrial and Power Electronics	Tata McGraw Hill
2.	P.C. Sen	Power Electronics	Tata McGraw Hill
3	M.D.Singh&	Power Electronics	Tata McGraw Hill

	K.B.Khanchandani		

b) Websites:

1) www.circuitstoday.com
2) www.daenotes.com
3) www.electronicsinstrumentsmanufacturer.com
4) www.talkingelectronics.com
5) www.bbs.sciencenet.net

COURSE ID :

Course Name : PROGRAMMABLE LOGIC CONTROLLER
Course Code : IEF502
Course Abbreviation : FPLC

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <>

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme :

Mode of	Progressive Assessment		Term End Examination	Total

Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Exam	
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 Pro-forma I	
Marks	**20**	**--**	**80**	--	**25E**	**125**

E-External Assessment * Assessment as per Pro-forma I

RATIONALE :

In industry, many manufacturing processes demand a sequence of operation, which are to be performed repetitively. Early automation systems were mechanical in design, timing and sequencing being effected by gears and cams. Slowly these design concepts were replaced by electrical drives which were controlled by relays and now by programmable logic controllers (PLCs).

A PLC is a solid state device, designed to operate in noisy industrial environments and can perform all logic functions. PLCs are widely used in all industries for efficient control operations. A diploma holder in industry is called upon to design, modify and troubleshoot such control circuits. Looking at the industrial applications of PLCs in the modern industry, this subject finds its usefulness in the present curriculum.

COMPETENCY:

Design industrial automation circuitry based on PLC for different engineering applications

Cognitive : Understanding basics of PLC.

Psychomotor : Write a PLC program for wide range of industrial applications.

Affective : Attitude of i) Logic ii) accuracy iii) precision v) punctuality

COURSE OUTCOMES :

IEF502-1 Acquire the knowledge of PLC architecture, operation and characteristics.
IEF502-2 Acquire the knowledge of PLC input and output modules.
IEF502-3 Analyze different types of instructions set used for PLC.
IEF502-4 Develop and verify ladder diagrams for various simple applications.
IEF502-5 Develop and verify ladder diagrams for various industrial and engineering applications.
IEF502-6 Acquire knowledge about PLC installation and trouble-shooting.

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 and Cos	**Programme Outcomes POs and PSOs**											
	PO 1 Basic knowledge	**PO 2 Discipline knowledge**	**PO 3 Experiments and practice**	**PO 4 Engineering Tools**	**PO 5 The engineer and society**	**PO 6 Environment and sustainability**	**PO 7 Ethics**	**PO 8 Individual and team work:**	**PO 9 Communication**	**PO 10 Life-long learning**	**PSO 1Operate and Maintain**	**PSO 2Supervision and Providing Solution**
Competency: Design industrial automation circuitry based on PLC for different engineering applications	-	3	3	2	-	-	-	2	-	-	3	3

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
IEF502-1	-	3	1	-	-	-	-	1	-	-	-	-
IEF502-2	-	3	2	-	-	-	-	2	-	-	-	-
IEF502-3	-	3	2	2	-	-	-	2	-	-	2	2
IEF502-4	-	3	3	3	-	-	-	2	-	-	3	3
IEF502-5	-	3	3	3	-	-	-	2	-	-	3	3
IEF502-6	-	3	3	3	-	-	-	3	-	-	3	3

CONTENT :

THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEF502-1 Acquire the knowledge of PLC architecture, operation and characteristics			
1	**PLC Fundamentals** 1.1 Evolution and Role of PLC in Automation 1.2 Advantages and disadvantages of PLC 1.3 PLC Classification based on Type and Size: Fixed PLC and Modular PLC (nano/pico , mini, micro, medium, large) 1.4 PLC Architecture: Block diagram and description 1.4.1 CPU –function, scanning cycle, 1.4.2 Power supply- function, Block diagram. 1.4.3 Memory – function & organization of ROM &RAM 1.4.4 Input modules- function, diff. input devices used with PLC(only name & their uses) 1.4.5 Output modules- function, diff. output devices used with PLC(only name & their uses) 1.5 PLC Operation 1.5.1 PLC operation modes 1.5.2 PLC operating cycles 1.6 PLC characteristics 1.6.1 Racks 1.6.2 Application Specific Modules 1.6.3 Redundancy 1.6.4 Speed Of Execution	10	14
IEF502-2 Acquire the knowledge of PLC input and output modules			
2.	**PLC Hardware** 2.1 Discrete input modules: 2.1.1 Block diagram, typical wiring details and specifications of AC input modules & DC input module. 2.1.2 Sinking and sourcing concept in DC input modules. 2.2 Discrete output modules: 2.2.1 Block diagram description, typical wiring details and specifications of AC output module & DC output modules. 2.3 Analog input and output modules: Block diagram, typical wiring details and specifications 2.4 Sinking and sourcing Output Module 2.5 I/O module selection criterion	08	12

IEF502-3 Analyze different types of instructions set used for PLC.			
3	**PLC Instruction Set** 3.1 I/O addressing of PLC 3.2 Relay type instructions - NO, NC, One shot, Latch and Unlatch. 3.3 Timer instructions - On delay timer, off delay Timer, Retentive timer, and Timer reset. 3.4 Counter instructions - up counter, down counter, High speed counter, counter reset. 3.5 Comparison instructions – Equal, Not equal, Greater, Greater than equal, Less, Less than equal. 3.6 Arithmetic Instruction: ADD,SUB,MUL,DIV,NEG 3.7 Data handling instructions – Move, Masked Move and Limit test. 3.8 Logical instructions – AND, OR, EX-OR, NOT. 3.9 Miscellaneous instructions – Sequencer instructions, scale with parameter, subroutine and PID instructions.	12	14
	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 II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEF502-4 Develop and verify ladder diagrams for various simple applications			
4	**PLC Programming** 4.1 Different PLC programming languages (only introduction) - FBD, Instruction list, structured text, sequential Function chart, and ladder logic. 4.2 Ladder Programming for logic functions 4.3 PLC ladder programming for Boolean Algebra 4.4 Simple programming examples using ladder programming language based on relay, timer, counter, logical, comparison, Data handling and Miscellaneous instruction. 4.5 Programming based on analog sensor such as ADC, thumbwheel switches, RTD/thermocouple	12	14
IEF502-5 Develop and verify ladder diagrams for various industrial and engineering applications			
5	**PLC Applications:** Application development based on description such as (Ladder diagram with operation) 5.1 Object Counter 5.2 Motor sequence control. 5.3 Traffic light control. 5.4 Car Parking	12	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.5 Microwave Oven temperature controller 5.6 Elevator control. 5.7 Tank level control. 5.8 Reactor control. 5.9 Conveyor system 5.10 Filling of Bottles 5.11 Room/Building Automation 5.12 Stepper motor control 5.13 Speed Control of AC/ DC Motor using Programmable Drives		
IEF502-6 Acquire knowledge about PLC installation and trouble-shooting			
6	**PLC installation and Troubleshooting:** **6.1 PLC installation:** 6.1.1 Enclosures 6.1.2 Electrical Noise 6.1.3 Leaky Inputs and Outputs 6.1.4 Groundings 6.1.5 Noise Suppression 6.1.6 Maintenance Guidelines **6.2 PLC Troubleshooting** 6.2.1 Steps for Troubleshooting 6.2.2 Troubleshooting methods 6.2.3 Input and output troubleshooting guidelines 6.2.4 Troubleshooting of ladder program	08	12
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Applica--tion		
1	PLC Fundamentals	4	8	2	IEF502-1	14
2	PLC Hardware	4	6	2	IEF502-2	12
3	PLC Instruction Set	6	4	4	IEF502-3	14
4	PLC Programming	4	4	6	IEF502-4	14
5	PLC Applications	2	4	8	IEF502-5	14
6	PLC installation and Troubleshooting	4	4	4	IEF502-6	12
	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.

E) TERM WORK

Practical Exercises and related skills to be developed: (Minimum Eight practical's from List)

The following practical's should be performed on any PLC trainer Kit which is available

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	PLC Architecture and PLC Software Installation	Analyze different parts of PLC and able to install software required for different PLC.	IEF502-1
2	Logic gates by using PLC.	Write and Verify truth table of Logic gates by execution of ladder program	IEF502-4
3	Boolean Algebra	Verify Boolean equations by execution of ladder program	IEF502-4
4	Blinking of LED's	Write and verify ladder program for blinking by using timer.	IEF502-5
5	Sequential ON-Off control of Lamps	Write and verify ladder program for traffic signal control for two directions	IEF502-4,5
6	Elevator Control	Write and verify ladder program for elevator control	IEF502-4,5
7	Tank Level controller	Write and verify ladder program for tank level control	IEF502-4,5
8	Counters for pulse counting using limit switch/ proximity sensor	Write and verify ladder program for object counter using counter	IEF502-4,5
9	Analog sensor interfacing with PLC.	Write and verify ladder program for any analog sensor such as RTD, thermocouple, thumbwheel switch, etc	IEF502-4,5
10	AC Motor control by VVFD	Write, verify and control speed of any AC motor available by using VVFD	IEF502-4,5
11	DC Motor Control	Write, verify and control speed of any AC motor available.	IEF502-4,5
12	Mini Project(Compulsory)	Industrial application should be developed among two students. Application should be verified by ladder program and report should be prepared	IEF502-1,4,5

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

y) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 I.*

Criteria for assessment of 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

z) Criteria for assessment at semester end oral exam :
Every student shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Presentation	10
2	Conceptual Understanding	10
3	Overall Performance	05
	Total	25

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

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Gary Dunning-	Intro. To Programmable logic control	Delmar Publishers,
2.	F.D. Petruzella-	Programmable logic controllers	Example Product Manufacturer; 3rd edition (2004)
3	S.K.Bhattacharya & S. Chaterjee	Industrial Electronics & Control	Tata McGraw-Hill.
4	Vedam Subrahmanyam	Electric drives	Tata McGraw-Hill.

b) Websites:

1) www.allthingsplc.info
2) www.inmplc.com
3) www.plcdev.com
4) www.plcacademy.com

COURSE ID :

Course Name : PROJECT - I
Course Code : EIF503
Course Abbreviation : FPR1

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	00	02
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work*	Oral (Internal)	
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-VI	As per Proforma -V	
Marks	--	--	**NIL**	**50**	**25I**	**75**

I – Internal Examination * -

RATIONALE :

In the field of Electronics Technology various technologies (hardware and Software) needs to be integrated and proper paradigms needs to be implemented to develop any kind of electronic system . Hence it becomes essential to get hands on experience for developing industrial applications. This subject is essential to understand the implementation of the system development process i.e. analyze, design, coding, debugging and testing.

The project work should be undertaken by group of 3 students who will jointly work and implement the project with the approval of guide. The group of student should decide the area of proposed work as per requirement of Industry/community or environment and work together for hardware &software if necessary solution for that work.

The project work is divided into two phases. In the first phase the group is expected to submit a synopsis upon choosing a project work. The project should be selected within two weeks on the group formation and a brief synopsis of the project should be submitted to the HOD & guide .The synopsis report should include following points:

- Title of project
- Introduction
- Study of existing system
- Need of proposed work / Choice of topic with reasoning
- Literature review / Related work

- Hardware and software requirements
- Outline of proposed work
- Block diagram
- Expected schedule

Student should work on detailed system design and complete 30 to 40 percent of work out of complete project work as a part of term work submission in the form of joint report. The group should work every week in the project duration and appraise the guide about their work progress. Guide should closely monitor the work and help the students from time to time. The guide should also maintain a record of continuous assessment of project work progress on weekly basis.

The term work assignment should be carried out under the guidance of appointed project guide by Head of Dept. During Summer Break after IV semester (i.e. between IV and V Semester), Department would ensure mandatory placement of students for 4 weeks industrial training. Training should be relevant to the branch or discipline of engineering. This training would be evaluated during V semester as part of term work.

A seminar should be delivered by each student in group on the selected project topic as part of oral examination. The oral examination will be conducted by internal examiner as appointed by the Institute.

COMPETENCY:

Design and develop prototype for an identified engineering application or process.

Cognitive: Understands the steps involved in implementation of the electronics system development like analysis, design, coding, debugging and testing.

Psychomotor: Operate and Maintain of a prototype for an industrial applications

Affective: Attitude of i) Leadership ii) Innovativeness iii) Logic iv) accuracy v) precision v) punctuality

COURSE OUTCOMES:

EIF 503-1 Acquire practical knowledge to perform basic tasks in industry.
EIF 503-2 Identify/Discover short falls in industrial application or process & develop innovative ideas.
EIF 503-3 Work in group and plan, coordinate the work.
EIF 503-4 Provide solution by implementing the practical knowledge.
EIF 503-5 Write the project seminar work and industrial training report.
EIF 503-6 Represent the work done.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Design and develop prototype for an identified engineering application/process	-	1	1	1	1	-	1	1	-	1	1	1
EIF 503-1	-	1	2	2	1	-	2	2	-	1	-	-
EIF 503-2	-	1	-	-	-	-	2	2	-	1	-	2
EIF 503-3	-	1	2	-	-	-	2	-	-	1	2	2
EIF 503-4	-	1	3	3	-	-	-	3	-	1	3	3
EIF 503-5	-	1	-	1	-	-	-	-	-	1	-	-
EIF 503-6	-	1	-	1	-	-	-	-	3	1	-	-

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

a) Term work :
i) Criteria for Continuous Assessment of Practical work and Progressive skill Test:

Domain	Particulars	Marks out of 25
Cognitive	Attendance and Technical preparedness	10
Psychomotor	Hardware/Software Designing	10
	Logical Thinking and Approach	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		**50**

b) **Term-end Oral Examination :**
A seminar should be delivered by group of students on the selected project topic
Every student shall be assessed by internal examiner as per the following criteria:

Domain	**Particulars**	**Marks out of 25**
Cognitive	Selection of Topic	05
	Presentation Skill	05
Psychomotor	Hardware Designing	05
	Logical Thinking and Approach and Conceptual understanding	05
Affective	Discipline and punctuality	05
	Decency and presentation	
TOTAL		**25**

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	**Author**	**Title**	**Publisher**
1.	Walter C. Bosshart	Printed Circuit Boards	Tata McGraw Hill
2.	Williams	Build your own printed circuit board with CD	Tata McGraw-Hill

b) Websites:

1) www.efy.com
2) www.electronicshub.org
3) www.datasheet.com

c) Magazines:

1) Electronics for you
2) Digital Electronics
3) Electronics Design
4) Electropages

GOVERNMENT POLYTECHNIC, KOLHAPUR

(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 :

Project Outcomes (PROs)	Programme Outcomes POs and PSOs													
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO1	PSO2	PSO3	PSO4
1. ….														
2. ….														
3. ….														

Details of Students' Group : Project Batch - ……

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

Detailed Planning of Project Work :

SN	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

GOVERNMENT POLYTECHNIC, KOLHAPUR

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Performa P-2

FINALIZATION OF PROJECT GROUPS, TOPICS AND GUIDES

Prograamme : **Academic Year :** **Class :**
Date :

SN	Project Group ID	Project Group		Title of Project	Name of Project Guide	Type of Project (Product making / research / problem solving / industry based / etc.)
		Roll No.	Names of Students			
1.						
2.						
3.						
4.						
5.						
6.						
7.						
…						

Name and signature of Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

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Performa P-3

ASSESSMENT RUBRICS FOR SYNOPSIS OF PROJECT

SN	Assessment point	Performance grades and their meaning for each assessment point					Assessment point-wise score (out of 5) of each student in project group						
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No. : …… ….	Roll No. : …… ….	Roll No. : …… ….
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
TOTAL SCORE >>													

Prograamme : **Academic Year :** **Title of Project :**

Project Group ID : **Name of Project Guide :**

Date :

Project Guide **Programme Dean**

GOVERNMENT POLYTECHNIC, KOLHAPUR

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Performa P-4

ASSESSMENT RUBRICS FOR DEMONSTRATION-1 OF PROJECT

SN	Assessment point	Performance grades and their meaning for each assessment point					Assessment point-wise score (out of 5) of each student in project group						
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No. : …… ….	Roll No. : …… ….	Roll No. : …… ….
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
TOTAL SCORE >>													

Prograamme : **Academic Year :** **Title of Project :**

Project Group ID : **Name of Project Guide :**

Date :

Project Guide **Programme Dean**

GOVERNMENT POLYTECHNIC, KOLHAPUR

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Performa P-5

ASSESSMENT RUBRICS FOR DEMONSTRATION-2 OF PROJECT

SN	Assessment point	Performance grades and their meaning for each assessment point					Assessment point-wise score (out of 5) of each student in project group						
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No. : …… ….	Roll No. : …… ….	Roll No. : …… ….
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
TOTAL SCORE >>													

Prograamme : **Academic Year :** **Title of Project :**

Project Group ID : **Name of Project Guide :**

Date :

Project Guide **Programme Dean**

GOVERNMENT POLYTECHNIC, KOLHAPUR

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Performa P-6

ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECT

SN	Assessment point	Performance grades and their meaning for each assessment point					Assessment point-wise score (out of 5) of each student in project group						
		Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No.: …… ….	Roll No. : …… ….	Roll No. : …… ….	Roll No. : …… ….
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
TOTAL SCORE >>													

Prograamme : **Academic Year :** **Title of Project :**

Project Group ID : **Name of Project Guide :**

Date :

Project Guide **Programme Dean**

COURSE ID :

Course Name : PROJECT - II
Course Code : EIF 504
Course Abbreviation : FPR2

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : PROJECT - I (EIF503 FPR1)

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	00	04
Practical	04	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Oral (Internal)	
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-VI	As per Proforma IV	
Marks	--	--	**NIL**	**50**	**75E**	**125**

E – External Examination

RATIONALE :

In the field of Electronics Technology various technologies (hardware and Software) needs to be integrated and proper paradigms needs to be implemented to develop any kind of electronic system . Hence it becomes essential to get hands on experience for developing industrial applications. This subject is essential to understand the implementation of the system development process i.e. analyze, design, coding, debugging and testing.

The project work should be undertaken by group of 3 students who will jointly work and implement the project with the approval of guide. The student should decide the area of proposal work as per requirement of Industry / community or environment and work together for hardware / software solution for that work.

The project work is divided into two phases. In the second phase student should work on detailed system design, layout, construct hardware, test and produce satisfactory results by completing project work as a part of term work submission in the form of joint report.

The term work assignment should be carried out under the guidance of appointed project guide by Head of Dept. During Winter Break after V semester (i.e. between V and VI Semester), Department would ensure mandatory placement of students for 2 weeks industrial training. Training should be relevant to the branch or discipline of engineering. This training would be evaluated during VI semester as part of term work.

The group is expected to submit a report of a project work at the end of semester. The report should include following points:

- Title of project
- Introduction
- Study of existing system
- Need of proposed work / Choice of topic with reasoning
- Literature review / Related work
- Requirement Analysis
- Hardware and software requirements
- System design that includes details of modules of system along Block diagram, Circuit diagram, operation of circuit, description of components, algorithm of software, datasheets etc.
- Implementation details with snapshots
- Applications
- Conclusion and Future work
- Bibliography

These points are guidelines to the students. Students shall prepare a report containing these and additional points if any depending on the project as guided by the appointed project guide. The oral examination will be conducted by internal and external examiner as appointed by the Institute.

COMPETENCY:

Design and develop prototype for an identified engineering application or process.

Cognitive : Understands the steps involved in implementation of the electronics system development like analysis, design, coding, debugging and testing..

Psychomotor : Design and implement a prototype for an industrial applications

Affective : Attitude of i) Leadership ii) Innovativeness iii) Logic iv) accuracy v) precision v) punctuality

COURSE OUTCOMES:

EIF 504-1 Acquire practical knowledge to perform basic tasks in industry.
EIF 504-2 Identify/Discover short falls in industrial application or process & develop innovative ideas.
EIF 504-3 Work in group and plan, coordinate the work.
EIF 504-4 Provide solution by implementing the practical knowledge.
EIF 504-5 Write the project seminar work and industrial training report.
EIF 504-6 Represent the work done.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Design and develop prototype for an identified engineering application/process	-	2	1	1	-	-	1	1	-	1	1	1
EIF 504-1	-	2	2	2	-	-	2	2	-	1	-	-
EIF 504-2	-	2	-	-	-	-	2	2	-	1	-	2
EIF 504-3	-	2	2	-	-	-	2	-	-	1	2	2
EIF 504-4	-	2	3	3	-	-	-	3	-	1	3	3
EIF 504-5	-	2	-	1	-	-	-	-	-	1	-	-
EIF 504-6	-	2	-	1	-	-	-	-	-	1	-	-

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

a) Term work :

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

Domain	Particulars	Marks out of 25
Cognitive	Attendance and Technical preparedness	10
Psychomotor	Hardware/Software Designing	10
	Logical Thinking and Approach	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		**25**

b) **Term-end Oral Examination :**
Every student shall be assessed by examiner as per the following criteria

Criteria for assessment at semester end oral exam:

Domain	**Particulars**	**Marks out of 75**
Cognitive	Conceptual Understanding	10
Psychomotor	PCB designing, Mounting components & soldering	15
	Logical Thinking and Approach	15
Affective	Discipline and Project Report submission punctuality	15
	Decency and Project presentation	20
TOTAL		**75**

REFERENCE MATERIAL:

a) Books / Journals/ IS Codes

Sr. No.	**Author**	**Title**	**Publisher**
1.	Walter C. Bosshart	Printed Circuit Boards	Tata McGraw Hill
2.	Williams	Build your own printed circuit board with CD	Tata McGraw-Hill

b) Websites:

1) www.efy.com
2) www.electronicshub.org
3) www.datasheet.com

c) Magazines:

1) Electronics for you
2) Digital Electronics
3) Electronics Design
4) Electropages

COURSE ID:

Course Name : OPTOELECTRONICS
Course Code : IEF505
Course Abbreviation : FOPT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Exam	
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)	--	Internal Oral Exam	
Marks	**20**	**--**	**80**	--	**25I**	**125**

I-External Assessment * Assessment as per Pro-forma II

RATIONALE :

Today optical electronics has become backbone of Telecommunication industry. Speed being the major advantage of this technology .Day by day optoelectronics is replacing traditional electronics in many fields. The students must understand need of higher data rates and solutions to achieve such data rates through optoelectronics

COMPETENCY: Illustrate practical information & technical background for different optical sources and detector.
Cognitive: Differentiate different types of optical sources and detector.
Psychomotor: Use different types and sources for electronic applications.
Affective: Attitude of i) accuracy ii) precision iii) punctuality iv) knowledge.

COURSE OUTCOMES :

IEF505-1 Illustrate basic physics of light.
IEF 505-2 Acquire principles of optical sources.
IEF505-3 Identify different optical detectors.
IEF505-4 Distinguish various sources and detector.
IEF505-5 Build the circuit for optocouplers.
IEF505-6 Apply solar cell for different 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 **]**

Competency and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Build Optoelectronics based system for telecommunication engineering applications	-	3	2	-	-	-	-	-	-	-	2	2
IEF505-1	-	2	1	-	-	-	-	-	-	-	-	-
IEF505-2	-	3	2	-	-	-	-	-	-	-	2	2
IEF505-3	-	3	2	-	-	-	-	-	-	-	2	2
IEF505-4	-	3	3	-	-	-	-	-	-	-	3	3
IEF505-5	-	2	1	-	-	-	-	-	-	-	3	3
IEF505-6	-	3	-	-	-	-	-	-	-	-	-	-

CONTENT :

THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	IEF505-1 Illustrate basic physics of light		
1	**Basic physics of light** 1.1Spectrum of light 1.2visible , infrared , ultraviolet, fiber optic band in light spectrum 1.3The quantum nature of light -Plank's law, concept of photon 1.4Basic optical laws – refractive index , Reflection ,refraction, polarization 1.5 Lightintensity, its units, optical power.	04	08
	IEF505-2 Acquire principles of optical sources.		
2.	**Optical sources- 1** 2.1Natural light sources, 2.2 Incandescent lamps-construction & working, Emission spectra 2.3Light emitting diodes- Types of LED :- 2.3.1 Heterojunction&Homojuntion LED 2.3.2 Construction Of following:- Planar LED, DomeLED, Surface emitter LED, Edge emitter LED 2.3.3Energy level diagram, emission spectra , Electrical characteristics 2.4Infrared LED – ratings ,electrical characteristic, emission spectra 2.5 Merits and Demerits of LED's 2.6 Applications of LED's	10	16
	IEF505-3 Identify different optical detectors.		
3	**Optical Sources -2** 3.1Basic Principle Of LASER : Absorption , Spontaneous and stimulated emission of radiation, Population inversion , 3.2 Characteristics of LASER: monochromatic, directional, Coherent light sources. 3.3Materials used for LASER 3.4Types of LASER:- 3.4.1 Fabry-Perot Resonant Cavity- construction and working 3.4.2Semiconductor Injection laser – Construction, working, electrical characteristics. 3.5 Injection laser characteristics 3.6 Advantages & Disadvantages of LASER 3.7 Comparison of LED and LASER. 3.8 LASER applications.	10	16
	Total	**24**	**40**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (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)
	IEF505-4 Distinguish various sources and detector.		
4	**Photodetectors – 1** 4.1 Classification of photo detectors. 4.2 Photo detector characteristics 4.3 Photo resistors – spectral response , speed of Response. 4.4 Merits and Demerits of photo resisters. 4.5 Applications of photo resistors	04	10
	EIF505-5 Build the circuit for optocouplers.		
5	**Photo detectors - 2** 5.1Photodiodes – construction , spectralResponse , electrical characteristics , Equivalent circuit, directional sensitivity, Advantages & Disadvantages 5.2PIN photodiode - construction , spectral Response ,electrical characteristics , Equivalent circuit , directional sensitivity Advantages & Disadvantages 5.3 Avalanche photodiode - construction ,spectral Response ,electrical characteristics ,Equivalent circuit , directional sensitivity Advantages & Disadvantages 5.4Phototransistor – construction, electricaland optical characteristics, photo-Darlington. Advantages & Disadvantages 5.5 Comparison between photo resistor and hotodiodes 5.6 Comparison between photodiode and phototransistors 5.7 Applications of all Photodetectors.	10	16
	IEF505-*6 Apply solar cell for different applications.*		
6	Other optoelectronic devices 6.1Opto-couplers- specifications , various Combinations , advantages 6.2Applications of opto- couplers 6.3LED displays – types , specifications 6.4LCD displays - types , specifications 6.5Comparison of digital displays 6.6Solar cells – construction, equivalent circuit, electrical characteristics, Si and Se solar cells. 6.7Applications of solar cells	12	14
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Physics of light	04	04	00	IEF505-1	08
2	Optical sources -1	04	04	08	IEF505-2	16
3	Optical sources -2	02	08	06	IEF505-2	16
4	Photo detectors - 1	04	04	02	IEF505-4	10
5	Photo detectors -2	04	04	08	IEF505-5	16
6	Other optoelectronic devices	04	04	06	IEF505-6	14
TOTAL		22	28	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.

F) TERM WORK

Practical Exercises and related skills to be developed: (Minimum Eight practical's from List)

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Study of data sheets and specifications of LED and verification of characteristics	Study specifications and verify characteristics of LED	IEF505-2
2	Study of data sheets and specifications of IR LED and verification of characteristics	Study specifications and verify characteristics of IR LED	IEF505-2
3	Study of data sheets and specifications of LASER diode and verification of characteristics	Study specifications and verify characteristics of laser diode	IEF505-3
4	Study of directional response of LED	Plot directional response of LED	IEF505-2
5	Study of directional response of LASER diode	Plot directional response of LASER diode	IEF505-3
6	Study of data sheets and specifications of Photodiode and verification of characteristics	Study specifications and verify characteristics of Photodiode	IEF505-4
7	Study of data sheets and specifications of PIN Photodiode and verification of characteristics	Study specifications and verify characteristics of PIN Photodiode	IEF505-5
8	Study of data sheets and specifications of Avalanche Photodiode and verification of characteristics	Study specifications and verify characteristics of Avalanche Photodiode	IEF505-5
9	Study of data sheets and specifications of Photo resistor and verification of characteristics	Study specifications and verify characteristics of Photo resistor	IEF505-4
10	Study of data sheets and specifications of Phototransistor and verification of characteristics	Study specifications and verify characteristics of Phototransistor	IEF505-5
11	Study of data sheets and specifications of Solar cells and	Study specifications and verify characteristics of solar cells	IEF505-6

	verification of characteristics		

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

aa) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 II.*

bb) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 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	Presentation	05
	Total	25

Assessment at semester end practical exam as per Pro-forma II.

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Integrated circuits and semiconductor devices	Deboo / Burrous	McGRAW Hill Publication
2.	Optical fibre communication	Keiser	TMH Publication

b) Websites:

1) www.tatamcgrawhill.com
2) www.nptel.ac.in

COURSE ID :

Course Name : ROBOTICS
Course Code : IEF506
Course Abbreviation : FROB

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : <>

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Oral Exam	
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-II	
Marks	**20**	**--**	**80**	-	**25I**	**125**

I-Internal Assessment * Assessment as per Pro-forma II

RATIONALE :

Due to globalization and competition industries are developing fast and incorporating automation in various sectors .The future trend indicates that 'Robots 'will be used to carry out some activities to improve the efficiency of the industry. This subject has been identified in technology area as an elective. Knowledge of this subject will be helpful in the maintenance of Robots. Contents of this subject will provide an opportunity to understand the applications of Robots especially covering risk factors.

COMPETENCY:

Analyze robotic components and build robot based systems for engineering applications.
Cognitive : Describe the operational details of robot, its motion and application.
Psychomotor : Control the motion of robot through drive system .
Affective : Attitude of i) Logical ability ii) accuracy

COURSE OUTCOMES:

IEF506-1 Identify the different robot components, specifications and its constructional details.
IEF506-2 Understand the robot classification, anatomy, motion and its drive system.
IEF506-3 Understand the gripper mechanism and robot end effectors.
IEF506-4 Explore the details of various types of sensors in robot.
IEF506-5 Explore the role of robots in different applications.
IEF506-6 Understand the robot preventive maintenance and safety in robots.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Analyze robotic components and build robot based systems for engineering applications.	2	3	2	3	-	-	-	-	-	-	2	2
IEF506-1	2	3	-	-	-	-	-	-	-	-	-	-
IEF506-2	-	3	1	-	-	-	-	-	-	-	-	-
IEF506-3	-	3	2	2	-	-	-	-	-	-	-	-
IEF506-4	-	3	2	3	-	-	-	-	-	-	2	2
IEF506-5	-	3	2	3	-	-	-	-	-	-	2	2
IEF506-6	-	3	2	3	-	-	-	-	-	-	2	2

CONTENT :

THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEF506-1 Identify the different robot components, specifications and its constructional details.			
1	**Robots Parameters** 1.1 Concept of Robotics 1.2 Roll of Robots in various manufacturing industries 1.3 Robots specifications parameters :- 1.4 Stationary Robots :Range of operation, Speed, Repeatability, Teaching method, No. of controllable axes, External interface PLC function, Programming Capacity, Dimensions, Weight 1.5 Mobile Robots : Physical, Constructional, Power, Mobility, Swing Radius, Software , Sensing and Manipulation, Onboard computing Electronics	08	14
IEF506-2 Understand the robot classification, anatomy, motion and its drive system.			
2.	**Robot motion** 2.1 Robot classification: According to applications, According to control system 2.2 Robot Anatomy Polar configuration ,Cylindrical , Configuration, Cartesian configuration , Joint arm configuration 2.3 Robot Motion Vertical transverse, Radial transverse, Rotational transverse , 2,3 and 4 Degree of freedom, Speed of Motion and Load carrying Capacity 2.4 Precision of Movement: Special Resolution ,Accuracy, Repeatability 2.5 Robot Drive Systems Hydraulic Drives, ,Electric Drive, Pneumatic Drive	10	14
IEF506-3 Understand the gripper mechanism and robot end effectors.			
3	**Robot End effectors** 3.1 Gripper Mechanisms CAM actuated gripper, Screw type gripper, 3.2 Vacuum cubs, Magnetic grippers, Adhesive grippers, Hooks & other misc. devices 3.2 END effecter interface Physical Support, Power & signal transmission, Various consideration in gripper selection	06	12
	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 II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEF506-4 Explore the details of various types of sensors in robot.			
4	**Sensors in Robots** 4.1 Sensing of physical parameters : Desirable features of the sensors, Types of sensors, Tactile sensors, Force / torque sensors, Proximity / Range sensors 4.2 Machine vision : Functions of machine vision (Block Diagram), Illumination Techniques, Sending digital image, Major steps of image compression, Segmentation Thresholding. techniques, multilevel thresholding, region splitting, region merging, Feature extraction, thinning, Object recognition, noise detection and removing (near neighbor technique)	10	14
IEF506-5 Explore the role of robots in different applications.			
5	**Applications of Robotics** 5.1 Multiple robots , machine interface , robots in manufacturing and non- manufacturing. Applications, Selection of robot. **5.2** Material transfer, Loading / unloading, Welding : Spot welding and Arc welding,- Assembly , Spray coating, Grinding, Future applications	06	12
IEF506-6 Understand the robot preventive maintenance and safety in robots.			
6	**Maintenance & Safety** 6.1 Maintenance : Robot preventive maintenance, Robot Refurbishment, Robot overhaul,- Sub Assembly recondition and rebuild onsite maintenance. 6.2 Safety in Robots : Workplace Deign, safety sensor, safety monitoring	08	14
	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.			

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

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Applica--tion		
1	Robots Parameters	06	06	02	IEF506-1	14
2	Robot motion	06	06	02	IEF506-2	14
3	Robot End effectors	04	04	04	IEF506-3	12
4	Sensors in Robots	04	06	04	IEF506-4	14
5	Applications of Robotics	04	06	02	IEF506-5	12
6	Maintenance & Safety	06	04	04	IEF506-6	14
TOTAL		30	30	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.

G) TERM WORK

Practical Exercises and related skills to be developed: (Minimum Eight practical's from List)

The following practical exercises shall be conducted as

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	To prepare a report on following points using searching of information through internet: 1. Manipulator 2. End effectors 3.Link 4. Joint 5. Robot Motion 6. Robot Applications.	Learn & understand the concept of robotics and prepare report .	IEF506-1
2	To study of Robot Motion Vertical transverse, Radial transverse, Rotational transverse , 2,3 and 4 Degree of freedom, Speed of Motion	Understanding the concept of Vertical transverse, , Radial transverse, Rotational transverse , 2,3 and 4 Degree of freedom, Speed of Motion	IEF506-2
3	To control forward and backward (rotational transverse) movement of the object coupled with the shaft of D.C. motor using limit switch (D.C. motor shaft coupled with screw.)	Learn & understand the concept	IEF506-2
4	To prepare a report on comparison and application of the carious type of grippers	Learn & understand the concept	IEF506-3

	mentioned in the syllabus after conducting group discussion with reference to following points: Types gripper mechanism, Applications and Effect of loading (load carrying capacity)		
5	To study of Hydraulic Drives, Electric Drive, Pneumatic Drive	Learn & understand the concept of Hydraulic Drives, ,Electric Drive, Pneumatic Drive	IEF506-3
6	To perform the pick and place operation using magnetic gripper and to determine maximum load carrying capacity for the given magnetic gripper	Learn & understand the concept	IEF506-4
7	To determine various factors affecting on proximity using proximity switch .	Learn & understand the concept	IEF506-4
8	Search the information from the internet about any one application of robot and make	Learn & understand the concept	IEF506-5
9	Study different types of robots by arranging industrial visits.	Understand the application of Robots in various Industries	IEF506-6

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

cc) 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
	Application	05
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
TOTAL		**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 II.*

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

dd) Criteria for assessment at semester end oral exam:

Every student shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Presentation	10
2	Conceptual Understanding	10
3	Overall Performance	05
	Total	25

Assessment at semester end oral exam as per Pro-formaII

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Mike II P	Groove Industrial Robotics	McGraw Hill
2.	R.J. Schiling	Fundamental of Robotics	Prentice Hall of India
3	R.D. Klafter	Robotics Engineering	Prentice Hall of India
4	Ghosh	Control in Robotics and Automation: Sensor Based Integration	***Allied Publishers***

b) Websites:

1. www.adept.com
2. www.robots.epson.com
3. www.tpctraining.com
4. www.kawasakirobotics.com
5. www.fanuc.com
6. www.panasonic.com
7. www.motoman.com
8. www.festo.com

Course ID :
Course Nam : ENERGY CONSERVATION
Course Code : EIF 507
Course Abbreviation : FECN
Pre-requisites : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory Examination	Term Work	Practical Examination (External)	
Details of Evaluation	Average of two tests of 20 marks each	i.25 marks for continuous assessment ii.One PST of 25 marks	Term End Theory Exam (03 hours)	-	As per Performa II	
Marks	20		80	-	25 I	125

Rationale:

The pressure on the natural resources of energy such as water, coal, gas, wood and other fuels has lead to the increasing costs of energy around the world. Efficient and judicious use of the available energy would lead to the easing of such pressures and drastic decrease in the operating costs of the organizations and industries. Thus it is necessary to save and conserve energy to the maximum possible extent. The process of energy audit will help to identify the various possible avenues in which savings of energy can be effectively affected. This course makes the diploma holder well conversant in the techniques of energy conservation in the fields of engineering. It also introduces him to the energy audit procedures.

Course Competency: Use environment friendly energy conservation techniques and assist in energy audits.

Course Outcomes

EIF 507-1 Identify present environmental effects and suggest use of Non Conventional Energy sources.
EIF 507-2 Use Co-generation Systems
EIF 507-3 Implement energy conservation techniques in electrical machines
EIF 507-4 Implement energy conservation techniques in electrical lighting systems
EIF 507-5 Implement energy conservation techniques in electrical power distribution system
EIF 507-6 Assist in energy audit works

Competency, course outcomes and programme outcomes/programme specific outcomes (cp-co-po/pso) matrix

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "0"]

	Programme Outcomes (POs)											
Competency and COs	**PO 1 Basic knowledge**	**PO 2 Discipline knowledge**	**PO 3 Experiments and practice**	**PO 4 Engineering Tools**	**PO 5 The engineer and society**	**PO 6 Environment and sustainability**	**PO 7 Ethics**	**PO 8 Individual and team work:**	**PO 9 Communication**	**PO 10 Life-long learning**	**PSO 1 Operate and Maintain**	**PSO 2 Supervision and Providing Solution**
Competency: Use environment friendly energy conservation techniques and assist in energy audits.	1	1	1	-	-	1	-	1	-	-	-	-
EIF 507-1 : Identify present environmental effects and suggest use of Non Conventional Energy sources	1	-	1	-	1	1	-	1	-	-	-	-
EIF 507-2 : Use cogeneration system	1	1	1	-	-	2	-	1	-	-	-	-
EIF 507-3 : Implement energy conservation techniques in electrical machines	-	2	1	-	-	1	-	1	-	-	-	-
EIF 507-4 Implement energy conservation techniques in lighting systems	-	2	1	-	-	1	-	1	-	-	-	-
EIF 507-5 Implement energy conservation techniques in electrical power distribution systems	1	2	1	-	-	1	-	1	-	-	-	-
EIF 507-6 Assists in energy audit works	2	1	1	-	-	1	-	1	-	-	-	-

CONTENTS:
THEORY

Section I

Sr. no.	Topics / sub-topics	Teaching (Hours)	Theory evaluation Marks
	EIF 507-1 Identify present environmental effects and suggest use of Non Conventional Energy sources.		
1	**Present Energy Scenario and environment** Review of various energy sources Classification of Energy: Primary and secondary energy, Commercial and non-commercial energy, Renewable and Non-renewable energy. Energy production and needs of growing economy like India, energy pricing in India, energy sector reforms, Salient features of Electricity Act 2003. Relation between Energy and Environment Issues of global environment Causes of Ozone layer depletion and its effects and measures to counter it. Global warming implications with special emphasis on green house effect, steps to reduce it.	08	12
	EIF 507-2 Use Co-generation Systems		
2	2.1 **Thermal Energy and Co- Generation:** Thermal energy of fuels, latent & sensible heat Evaporation, condensation, humidity, heat transfer. Need for Cogeneration Classification of cogeneration systems on the basis of the Sequence of energy use. Classification of cogeneration systems on the basis of the technologies. Steam turbine cogeneration, Advantages of cogeneration **2.2 Tariff::** Energy cost and recent MSEDCL tariff Applications of tariff system to reduce Energy bill Energy conservation by improving load factor and power factor Simple numerical	08	16
	EIF 507-3 Implement energy conservation techniques in electrical machines		
3	Energy conservation in Electrical Machines and their controls Energy efficient transformers: amorphous core transformers, epoxy resin cast transformers, specialty of cores and windings of such transformers. Energy conservation techniques in electric motors : Power flow diagram of induction motor, improving power quality, matching motor and load, operating in star mode, rewinding, minimizing idle and redundant running of motors, soft starters, VFD and improving mechanical power transmission efficiency . Energy efficient motors (EEM): features	08	12
	Total	24	40

Section II

Sr. no.	Topics Subtopics	Teaching (Hours)	Theory evaluation Marks
	EIF 507-4 Implement energy conservation techniques in electrical lighting systems		
4	**Energy conservation in lighting system:** Assessing existing lighting system, replacement of light sources, light control gears, motion detectors, separate transformer/ servo stabilizer for lighting ,regular survey and adequate maintenance programs, use of solid state devices such as microprocessors etc.	08	12
	EIF 507-5 Implement energy conservation techniques in electrical power distribution system		
5	**Energy conservation in distribution systems** Distribution losses at global, national and state level, commercial and technical losses. **Energy conservation techniques** Reducing line losses, compensating reactive power flow, optimizing distribution voltage , balancing phase currents and using energy efficient transformers . Reducing commercial losses.	08	14
	EIF 507-6 Assist in energy audit works		
6	**Energy audit** Energy flow diagrams with significance, audit instruments, questionnaire and ABC analysis. Walkthrough audit and detailed audit Calculations of simple payback period	08	**14**
	Total	**24**	**40**

Specification table for setting question paper for semester end theory examination

Section / Topic no.	Name of topic	Distribution of marks (level wise)			CO	Total marks
		Remember	Understand	Application		
I/1	Present Energy Scenario and environment	2	4	6	EIF 507 -1	12
I/2	Thermal Energy and Co-Generation	4	4	8	EIF 507 -2	16
I/3	Energy conservation in Electrical Machines and their controls	2	4	6	EIF 507 -3	12
II/4	Energy conservation in lighting system	2	4	6	EIF 507 -4	12
II/5	Energy conservation in distribution systems	2	4	8	EIF 507 -5	14
II/6	Energy audit	2	4	8	EIF 507-6	14

TERMWORK
Practicals / experiences and related skills developed.

Sr. no	Practical works	Skills/Information developed	
1	Energy conservation building code 2007	Conservation in buildings	EIF 507 -3, EIF 507 -4
2	Conduct Energy survey	1) Identify the various types of energy consumptions 2) Classify them and mark out their percentages in an industry.	EIF 507 -1 to EIF 507 -6
3	Data collection of consumers	Data collection of various consumers e.g. industries, commercials , agriculture and data analysis	EIF 507 -1 to EIF 507 -6
4	Compare different types of lamps (input power and output light)	Conduct practical to measure their input power and output light of various lamps	EIF 507 -4
5	Co generation	1) Visit a plant of cogeneration e.g. sugar industries , spinning mills , Heat processing unit 2) Prepare report on the cogeneration containing energy flow diagrams , economics and tariffs structure	EIF 507 -2
6	Environment issue	1) Collect data of pollution e.g. air, sound, water etc 2) Prepare report on it	EIF 507 -1
7	Case study.	Case study of any type small industry which has implemented energy conservation and auditing techniques.	EIF 507 -1 to EIF 507 -6

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

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	5
2	Correct figures / diagrams	10
3	Presentation	10
	Total	25

Instructional strategies:
1) Lectures and discussions.
2) Industrial visit / survey, experiences and interactive sessions.
3) Time bound assignments.
4) Case studies.

Books
b) Hand book by Bureau of Energy efficiency.
c) India: The Energy Sector, P. H. Henderson, Oxford University press.
d) Industrial Energy Conservation, D. A. Ray, Pergaman Press.
e) Energy Management Handbook, W. C. Turner, Wiley Press.

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	03
Practical	--	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination		Total
	Theory	Practical	Theory Examination	Term Work	
Details of Evaluation	Average of two tests of 20 marks each	1. 25 marks for each practical 2. 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

COURSE OUTCOMES :

CCF 501.1 Apply principles of management and carry out various functions of management.
CCF 501.2 Prepare organization structure for small and medium scale industry.
CCF 501.3 Perform duties of stores in-charge, material and finance manager.
CCF 501.4 Practice industrial safety rules, codes, practices and acts.
CCF 501.5 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 **]**

Competency and COs	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethic	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Plan and implement managerial and administrative strategies	-	-	-	-	1	-	1	1	1	-	2	2
CCF501.1 Apply principles of management and carry out various functions of management.	-	-	-	-	1	-	1	1	1	-	1	1
CCF501.2 Prepare organization structure for small and medium scale industry.	-	-	-	-	1	1	-	3	1	-	0	0
CCF501.3 Perform duties of stores in-charge, material and finance manager.	-	-	-	-	-	-	1	1	2	-	2	2
CCF501.4Practice industrial safety rules, codes, practices and acts.	-	-	-	-	1	-	1	1	2	-	3	3
CCF501.5 Apply various modern management techniques	-	-	-	-	1	-	1	3	2	-	2	2

CONTENT :

H) THEORY :

SECTION -I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCF 501.1Apply principles of management and carry out various functions of management.			
1	**PRINCIPLES OF MANAGEMENT** 1.1 Concept of management 1.2 Principles of management 1.3 Objectives of management 1.4 Scope and importance of management 1.5 Levels of management 1.6 Managerial competencies : Communication, Planning and Administration, Team work, Strategic action and General awareness	**06**	**10**
2	**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 2.3 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	**08**	**12**
3	**HUMAN RESOURCE 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 policy 3.3 Recruitment and selection of employees 3.4 Training : Objectives, benefits, types and methods 3.5 Workers Participation in Management	**06**	**10**
CCF 501.2 Prepare organization structure for small and medium scale 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**

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)
CCF 501.3Perform duties of stores in-charge, material and finance manager.			
5	**MATERIALS MANAGEMENT** 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	**06**	**10**
6	**FINANCIAL MANAGEMENT** 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	**04**	**08**
CCF 501.4 Practice industrial safety rules, codes, practices 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 501.5 Apply various modern management techniques.			
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**
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:

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Apply		
1	Principles Of Management	02	04	04	*CCF501.1*	10
2	Functions Of Management	02	04	06	*CCF501.1*	12
3	Human Resource management	04	04	02	*CCF501.1*	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

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.

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	Bangaand Sharma	Industrial Organisation& Management	Khanna Publisher
2	O P Khanna	Industrial Engg. & Management	DhanpatRai& sons New Delhi
3	P.C. Pandey & C. K. Sing	Management Science	DhanpatRai& sons New Delhi
4	Industrial Organisation	P.T. Ghan	Tata McGraw Hill
5	Management Information System	Waman S. Jawadekar	Tata McGraw Hill
6	P.C. Pandey&C.K.Sing	Management Science	DhanpatRai& sons New Delhi

b) Websites

i) nptel/iitm.ac.in

ii) http://iete.ac.in/subjects/amindustry/Mgmt.htm

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COURSE ID :

Course Name : MARKETING MANAGEMENT
Course Code : EIF509
Course Abbreviation : FMRM

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	03	03
Practical	NIL	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	Practical (3 hours)	--	
Marks	20	--	80	--	--	100

Cognitive :-To-understand-about-marketing-,market-,functions-,marketing of industrial products, planning,& advertising

Psychomotor :-to understand marketing management ,to do max. sale of products & to earn max. profit.

Affective :Attitude of i) Logic ii) accuracy iii) precision v)punctuality vi)hard working

COURSE OUTCOMES:

EIF 509-1- to understand marketing ,product selling.
EIF 509-2- to study market, its types, government policy.
EIF 509-3- to understand marketing functions & marketing managers duties.
EIF 509-4- to understand how to do marketing of industrial products.
EIF -509-5- to understand marketing planning, pricing, buying behavior of customer.
EIF 509-6- to understand how to do advertising of product to do capture market.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: to do best marketing management	-	-	-	-	1	-	1	1	1	-	3	3
EIF 509-1	-	-	-	-	1	-	1	1	1	-	2	1
EIF 509-2	-	-	-	-	1	-	1	1	1	-	2	1
EIF 509-3	-	-	-	-	1	-	1	1	1	-	3	2
EIF 509-4	-	-	-	-	1	-	1	1	1	-	3	3
EIF 509-5	-	-	-	-	1	-	1	1	1	-	3	3
EIF 509-6	-	-	-	-	1	-	1	1	1	-	3	3

CONTENT :

A) THEORY : Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 509-1- to understand marketing ,product selling.			
01 .	**Marketing** Meaning and significance of marketing, marketing system 1.1 Concept of marketing, product selling. 1.3 Trends in modern Marketing. 1.2 Difference between sales and marketing.	08	14
EIF 509-2- to study market, its types, government policy.			
02.	**Markets** 2.1 Meaning of market. 2.2 Types of markets. 2.3 Government and Industrial market.	06	12
EIF 509-3- to understand marketing functions & marketing managers duties.			
03.	**Marketing Functions And Management** 3.1 Market functions, meaning of marketing management 3.2 Functioning & Types of marketing organizations. 3.3 Marketing Manager and his duties.	10	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.			

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIF 509-4- to understand how to do marketing of industrial products.			
04 .	**Marketing Of Industrial Products** 4.1 Types of Industrial products 4.2 characteristics of marketing	10	15
EIF -509-5- to understand marketing planning, pricing, buying behavior of customer.			
05	**Important Concepts** 5.1 Considerations. Marketing planning, products decision, pricing decision. 5.2 Marketing strategy Marketing mix market survey, marketing 5.3 Information systems, buying Behaviors.	08	15
EIF 509-6- to understand how to do advertising of product to do capture market.			
06	**Role Of Advertising** 6.1 Role of advertising in Marketing	06	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.			

Specification table for question paper of theory examination:

Topic No.	Topic Name .	Distribution of Marks (level wise)				Total marks
		Knowledge	Comprehension	Application	Course outcome	
1	Marketing	10	04	0	EIF 509-1	14
2	Markets	08	04	0	EIF 509-2	12
3	Marketing Function & Management	10	04	0	EIF 509-3	14
4	Marketing Of Industrial Products	10	05	0	EIF 509-4	15
5	Important Concepts	10	05	0	EIF 509-5	15
6	Role Of Advertising	6	4	0	EIF 509-6	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.

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.Slide 4. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Condiff and Still	Basic Marketing	Prentice-Hall
2.	R.S.Davar	Marketing Management	
3.	Satynarayana.	Salesmanship, Sales management and Advertising	
4.	R.S.Davar	Modern Marketing Management	
5.	J.C.Sinha.	Marketing and Salesmanship	R. Chand
6.	Dholkia, Khurana	Marketing Management Cases and Concepts	

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COURSE ID :

Course Name : ENTREPRENEURSHIP DEVELOPMENT
Course Code : EIF 510
Course Abbreviation : FETD

TEACHING AND EVALUATION SCHEME :

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

Scheme component	Hours / week	Credits
Theory	03	03
Practical	NIL	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Detailsof Evaluation	Average of two tests of 20 marks each each)	i. 25 marks for each practical ii. One PST of 25 marks	One paper (3 hour)	Practical (3 hours)	--	
Marks	**20**	**--**	**80**	**NIL**	**--**	**100**

RATIONALE :

Globalization, liberalization & privatization along with revolution in InformatioTechnology, have thrown up new opportunities that are transforming lives of the masses. Talented and enterprising personalities are exploring such opportunities & translating opportunities into business ventures such as- BPO, Contract Manufacturing, Trading, Service sectors etc. The student community also needs to explore the emerging opportunities. It is therefore necessary to inculcate the entrepreneurial values during their educational tenure. This will help the younger generation in changing their attitude and take the challenging growth oriented tasks instead of waiting for whitecollar jobs. The educational institutions should also demonstrate their uniqueness in the creation of enterprising personalities in their colleges. This subject will help in developing the awareness and interest in entrepreneurship and create employment for others

Cognitive: - To develop awareness & interest to become entrepreneur, to do entrepreneurship, in younger students.

Psychomotor:-To start & run own enterprise through study of entrepreneurship successfully to creat employment for others.

Affective: Attitude of i) taking risk of business ii) accuracy iii) precision v)punctuality vi)hard working

COURSE OUTCOMES:

EIF 510--1- Study about entrepreneur, rural, women entrepreneurship & its growth,
EIF 510 -2- Motivate students for entreprenurship,to under stand small &large enterprises, & advantages of entrepreneur
EIF 510 -3- Under stand about project selection, project preparation, its appraisal &growth of business
EIF 510 -4- Understand financing of enterprise, capitals, loan, & source of finance.
EIF 510 -5- Study about institutional support, marketing of product, human recourse.
EIF 510 -6- Study about problems of small industries as power, finance, raw material, marketing, regulation & motivation training

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: to become successful entrepreneur.	-	-	-	-	1	-	-	2	-	-	3	3
EIF 510-1	-	-	-	-	1	-	1	3	1	-	2	1
EIF 510-2	-	-	-	-	1	-	1	3	1	-	2	1
EIF 510-3	-	-	-	-	1	1	-	3	-	-	3	2
EIF 510-4	-	-	-	-	1	-	-	-	-	-	3	3
EIF 510-5	-	-	-	-	1	-	-	-	-	-	3	3
EIF 510-6	-	-	-	-	1	1	1	2	1	-	3	3

CONTENT :

A) THEORY : Section I

Sr. No.	TOPIC/ SUB TOPIC	No. (Hours)	Evaluation Marks
EIF 510--1- Study about entrepreneur, rural, women entrepreneurship & its growth,			
1.	**Introduction: ENTREPRENEUR:** 1.1 Evolution, Characteristics, Types, Functions of Entrepreneur 1.2 Distinction between an Entrepreneur and a Manager, Concept, Growth of Entrepreneurship in India, Role of Entrepreneurship in Economic Development. 1.3 Rural Entrepreneurship: Concept, Need, Problems, Rural Industrialization in Retrospect, How to Develop Rural Entrepreneurship, NGOs and Rural Entrepreneurship 1.4 Women Entrepreneurship - Concept, functions, Growth of Women Entrepreneurs, Problems, Development of Trends,	10	14
EIF 510 -2-Motivate students for entreprenurship,to under stand small &large enterprises, & advantages of entrepreneur			
2.	**MOTIVATION** 2.1 Entrepreneurial Motivation Concept, Theories, factors, Entrepreneurial CompETFncies Concept, Major Entrepreneurial CompETFncies 2.2 Small Enterprises: Definition, Characteristics, Relationship between Small and Large Units, Rationale, 2.3 Objectives, Scope, Opportunities for an Entrepreneurial Career, Role of small Enterprise in Economic development, Problems of SSIs	06	12
EIF 510 -3- Under stand about project selection, project preparation, its appraisal &growth of business			
3.	**Project Identification And Selection (PIS)** 3.1 Meaning of Project, Project Identification, Project Selection, 3.2 Project Formulation: Meaning, Significance, Contents, Formulation, Planning Commission's Guidelines for Formulating a Project Report, Specimen of a Project Report, 3.3 Network Analysis, Common Errors in Project Formulation. 3.4 Project Appraisal Concept, Methods of project appraisal, Growth of Business Ideas, Intellectual Property.	08	14

Section-II

EIF 510 -4- Understand financing of enterprise, capitals, loan, & source of finance.		
Financing Of Enterprises 4.1 Need for Financial Planning, Sources of finance, Capital Structure, Term-loan, Sources of Short-Term Finance, Capitalization, Venture capital, Export Finance, Institutional 4.2 Finance To Entrepreneurs, Preparation of Business Plans, Commercial Banks, Other financial institutions like IDBI, IFCI, ICICI, IRBI, LIC, UTI, SFCs, SIDCs, SIDBI, EXI Bank	**10**	**14**
EIF 510 -5- Study about institutional support, marketing of product, human recourse		
Institution Support To Entrepreneurs: 5.1 Need for Institutional support - Small Entrepreneurs: NSIC, SIDO, SSIB, SSICS, 5.2 SISI, DICs, Industrial Estates Specialized Institutions, TCOs 5.3 Brief introduction about Marketing of products and services. 5.4 Human resource issues, Total quality management issues for small enterprises, Growth strategies in small businesses. 5.5 Sickness in small businesses, small enterprises in international business	**10**	**16**
EIF 510 -6- Study about problems of small industries as power, finance, raw material, ,marketing, regulation & motivation training		
Problems of Small Industries 6.1 Power shortages, Project planning, Finance, Raw materials, Production constraints, Marketing. ,Personal constraints, Regulation 6.2 Entrepreneurial Motivation Training, Motivating factors of Entrepreneurs, Achievement Motivation, Institutions assisting entrepreneurs	**04**	**10**
	48	**100**

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

Section / Topic no.	Name of topic	Distribution of marks			Total marks
		Knowledge	Comprehension	Application	
I/1.	Introduction: ENTREPRENEUR:	06	04	04	14
I/2	MOTIVATION	04	06	02	12
I/3	Project Identification And Selection (PIS)	06	04	04	14
II/1	Financing Of Enterprises	04	06	04	14
II/2	Institution Support To Entrepreneurs	04	04	08	16
II/3	Problems of Small Industries	02	04	04	10
	Total	26	28	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.

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Dr. O.P. Khanna	Industrial Engg & Management	Dhanpal Rai & sons New Delhi
2.	Dr. S.C. Saksena	Business Administration & Management	Sahitya Bhavan Agra
3	W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management	Prentice- Hall of India Pvt. Ltd. New Delhi - 110001

b) web-site :

www.ediindia.org

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COURSE ID :

Course Name : AUTOMOTIVE ELECTRONICS
Course Code : IEF511
Course Abbreviation : FAUT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : Nil

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End Examination		Total
	Theory	Practical	Theory Examination	Practical	
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-I	
Marks	**20**	**--**	**80**	**50E**	**150**

I-Internal Examination

RATIONALE:

Automotive sector is growing day by day and merging of automobile and electronics technology is leading to a safe and luxurious vehicles. Hence this course will provide inter disciplinary knowledge.

The objective of the course is to make the students understand the use of microcomputer, sensors, actuators and the use of various instrumentation systems in automobile.

COMPETENCY:

To get acquainted with various sensors, actuators and control units used in automobile electronics.

Cognitive: Understanding various components of automotive electronics and its operation.

Psychomotor: .

Affective: Attitude of i) Logical Thinking ii) Accuracy iii) Precision iv) Fault finding skills

COURSE OUTCOMES:

IEF511-1 Understand the operation of microcomputer and its architecture.
IEF511-2 Discover the characteristic details of various sensors and actuators used in automotive electronics.
IEF511-3 Understand the operation of various components of electronic engine management system.
IEF511-4 Explore various vehicle management systems used in automobile.
IEF511-5 Explore different automotive instrumentation systems used in automobile.
IEF511-6 Discover electronic safety systems used in automobile.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2Supervision and Providing Solution
Competency: To get acquainted with various sensors, actuators and control units used in automobile electronics.	1	2	-	-	-	-	-	1	-	-	-	-
IEF 511-1	3	1	-	1	-	-	-	-	-	1	-	-
IEF 511-2	3	1	2	2	-	-	-	-	-	1	-	-
IEF 511-3	3	2	2	3	-	-	-	2	-	1	-	-
IEF 511-4	3	2	3	3	-	1	-	2	-	1	-	2
IEF 511-5	3	2	3	3	-	1	-	2	-	1	-	2
IEF 511-6	3	2	-	-	-	1	-	2	-	1	-	-

CONTENT:

THEORY :

Section I

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
IEF511-1 Understand the operation of microcomputer and its architecture.			
01	**Introduction to microcomputer:** 1.1 Microcomputer 1.1.1 Buses, memory, timing, CPU registers 1.2 Microprocessor architecture 1.2.1 Initialization, operation codes, program counter, branch and jump instructions, subroutine. 1.2.2 Analog to digital converters and Digital to analog converters. 1.2.3 sampling, polling and interrupts, digital filters, lookup table.	08	10
IEF511-2 Discover the characteristic details of various sensors and actuators used in automotive electronics.			
02	**Sensors and actuators:** 2.1 Speed sensors, Pressure sensors 2.1.1 Manifold Absolute Pressure sensor, knock sensor. 2.1.2 Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor 2.1.3 Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor 2.2 Air mass flow sensor. Solenoids, stepper motors and relays	12	14
IEF511-3 Understand the operation of various components of electronic engine management system..			
03	**Electronic engine management system :** 3.1 Electronic engine control: Input, output and control strategies 3.2 Electronic fuel control system, fuel control modes: open loop and closed loop control at various modes 3.3 EGR control 3.4 Electronic ignition systems 3.4.1 Spark advance correction schemes 3.4.2 Fuel injection timing control.	12	16
	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 II

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
IEF511-4 Explore various vehicle management systems used in automobile.			
04	**Electronic vehicle management system:** 4.1 Cruise control system 4.2 Antilock braking system 4.3 Electronic suspension system 4.4 Electronic steering control 4.5 Traction control system 4.6 Transmission control	12	16
IEF511-5 Explore different automotive instrumentation systems used in automobile.			
05	**Automotive instrumentation system**: 5.1 Input and output signal conversion, multiplexing 5.2 Fuel quantity measurement 5.3 Coolant temperature and oil pressure measurement 5.4 Display devices- LED, LCD, VFD and CRT 5.5 Onboard diagnostics(OBD), OBD-II, off board diagnostics	12	16
IEF511-6 Discover electronic safety systems used in automobile .			
06	**Safety:** 6.1 Airbags 6.2 Collision avoiding system 6.3 Low tyre pressure warning system	08	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.			

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

Topic no.	Name of the Topic	Distribution Of Marks (Level Wise)			Course Outcome	Total Marks
		Remember	Understand	Applications		
1	Introduction to microcomputer	8	2	0	IEF 511-1	10
2	Sensors and actuators	8	6	0	IEF 511-2	14
3	Electronic engine management system	8	4	4	IEF 511-3	16
4	Electronic vehicle management system	8	4	4	IEF 511-4	16
5	Automotive instrumentation system	8	4	4	IEF 511-5	16
6	Safety	4	4	0	IEF 511-6	08
				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 :

Practical Exercises and related skills to be developed : (Minimum Eight practical's from List)

Sr No	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	To find the location and understand the task of different components on the car	• Locate different components of car. • Understand the operation of each.	IEF 511-2,3
2	To know symbols of components connectors, wires.	1. Identify the different symbols used for components. 2. Understand the use of wiring diagram.	IEF 511-3,4
3	Interpret the wiring diagram and understand different electrical circuits.	1. Interpretation of wiring diagram. 2. Understand the operation of wiring circuit.	IEF 511-3
4	To understand how the control units are connected using different CAN bus systems.	1. Discover the components of control units. 2. Understand the interfacing of control units.	IEF 511-3,4
5	To perform Alternator test	1. Identify the fault. 2. Understand the procedure of testing alternator.	IEF 511-4
6	To perform Starter circuit test	1. Identify the fault. 2. Understand the procedure of testing starter circuit.	IEF 511-4
7	To test battery	1. Identify the fault. 2. Understand the procedure of testing battery.	IEF 511-4, 5
8	To measure the output voltage & observe the output waveform of a crankshaft sensor	1. Explore the output characteristics of crankshaft sensor. 2. Understand its operation	IEF 511-2,4,5
9	To measure the output voltage & to observe the output waveform of a camshaft sensor	1. Explore the output characteristics of crankshaft sensor. 1. Understand its operation	IEF 511-2,4,5
10	To study fuel reserve signal function, cam shaft adjustment function, air injection function.	1. Identify the fault.. 2. Understand the procedure of fual injection,cam shaft adjustment.	IEF 511-3

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 as per given criteria.

ii) Progressive Skill Test:

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

Criteria for Progressive Assessment of Practical and Skill Test

Domain	Particulars	Marks out of 50
Cognitive	Technical preparedness for practical	05
Psychomotor	Algorithm /Flowchart	05
	Program/Logic	05
Affective	Discipline and punctuality	05
	Decency and presentation	05
TOTAL		**25**

f) Criteria for assessment at semester end practical exam :

Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria

Domain	Particulars	Marks out of 50
Cognitive	Technical Ability	05
	Logical Approach	05
Psychomotor	Procedural approach to fault	10
	Fault identifying skill	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
TOTAL		**50**

Assessment at semester end practical exam as per Pro-forma II

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

7. Lectures cum discussions
8. Regular home assignments
9. Laboratory work

Teaching and Learning resources:

11. Chalk board
12. Video clips
13. PPT Slides
14. Question Bank
15. Charts
6. Reference Books, Internet, Brochures of different Automotive Manufacturers

REFERENCE MATERIAL :

e) Books / Journals / IS Codes

Sr.No.	Author	Title	Publisher
1	Robert Bosch	Automotive Hand Book	SAE (8th Edition), 2011
2	Tom Denton	Automobile Electrical and Electronic Systems	4th edition- Routledge – 2012
3	Barry Hollembeak	Automotive Electricity and Electronics	Delmar Cengage Learning; 5th edition, 2011
4	William B Ribbens	Understanding Automotive Electronics: An Engineering Perspective	Newne Butterworth-Heinermann, 7th edition 2012
5	Kripal Singh Vol I	Automobile Engineering	Standerd Publishers, New Delhi
6	Kripal Singh Vol II	Automobile Engineering	Standerd Publishers, New Delhi

f) Websites:

1. www.google.com

COURSE ID :

Course Name : PIC MICROCINTROLLER
Course Code : EIF 512
Course Abbreviation : FPIC

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End Examination		Total
	Theory	Practical	Theory Examination	Practical	
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-I	
Marks	**20**	**--**	**80**	**50E**	**150**

E-External Examination

RATIONALE:

The subject is an extension of concepts covered in digital techniques. PIC microcontroller architecture, peripheral interfacing, assembly language programming is covered in this subject.

PIC Microcontroller is heart of all domestic, industrial, consumer goods and other high end products. The student will gain the knowledge of peripheral interfacing and programming them. PIC controller is in built element of embedded system. The subject will help the students to study concepts of embedded system. It will also help to understand design of simple microcontroller systems.

COMPETENCY:

Build PIC18F microcontroller based systems for different engineering applications.

Cognitive : Understanding PIC18F microcontroller architecture, working and instruction set.

Psychomotor : Write assembly language programs for wide range of applications.

Affective : Attitude of i) Logic ii) accuracy iii) precision v) punctuality

COURSE OUTCOMES:

EIF 512-1 Illustrate RISC/Harvard architecture of PIC18F microcontroller and discover its features.
EIF 512-2 Use instructions from the instruction set of PIC18F to write basic assembly language programs to develop logic.
EIF 512-3 Explore programming skills for I/O ports, Timers/Counters of PIC18F
EIF 512-4 Explore programming skills for Serial ports and CCP/ECCP modes.
EIF 512-5 Design interfacing of ADC, DAC, LCD, Keyboards etc. with PIC18F.
EIF 512-6 Design interfacing of DC motor, Stepper motor, Relay etc.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Build PIC18F microcontroller based systems for different engineering applications	1	2	1	1	-	-	-	1	-	1	2	1
EIF 512-1	2	-	-	-	-	-	-	-	-	1	-	-
EIF 512-2	2	-	2	1	-	-	-	1	-	-	-	-
EIF 512-3	1	2	-	-	-	-	-	-	-	-	1	-
EIF 512-4	1	2	-	-	-	-	-	1	-	-	3	2
EIF 512-5	-	2	2	1	-	-	-	1	-	1	3	2
EIF 512-6	-	3	1	1	-	-	-	1	-	1	3	2

CONTENT:

A) THEORY :

Section- I

Sr. No.	TOPIC/ SUB TOPIC	No. (Hours)	Evaluation Marks
EIF 512-1 Illustrate RISC/Harvard architecture of PIC18F microcontroller and discover its features.			
01	**PIC Architecture :** 1.1 RISC Architectural feature of PIC 1.2 Feature of PIC18f 1.3 Pin diagram 1.4 Architecture : Working Register (WREG), status register, Special function registers (SFRs) 1.5 PIC file register 1.6 PIC data format & directives 1.7 Bank Switching in PIC18	07	12
EIF 512-2 Use instructions from the instruction set of PIC18F to write basic assembly language programs to develop logic.			
02	**PIC Instruction & assembly Language Programming:** 2.1 Instruction size of PIC18 2.2 Addressing Mode 2.3 Instruction set: Data transfer instruction, Arithmetic instruction logical instruction, Control instruction using branch & Call, Bit oriented instruction, Table processing instruction 2.4 Simple programs	12	14
EIF 512-3 Explore programming skills for I/O ports, Timers/Counters of PIC18F			
03	**I/o Programming &Timer/counter of PIC:** 3.1 I/O port Programming 3.2 I/O bit manipulation Programming 3.3 Timer & Programming : Timer0, Timer1, Timer3 Timer4 3.4 Counter & Programming	13	14
	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- II

Sr. No.	TOPIC/ SUB TOPIC	Teaching (Hours	Theory evaluation Marks
***EIF 512*-4** Explore programming skills for Serial ports and CCP/ECCP modes			
04	**Serial Port & CCP,ECCP Programming of PIC:** 4.1 Interrupt & Programming 4.2 Serial Port Programming 4.3 Stand & enhance CCP module 4.4 Compare mode 4.5 Capture mode 4.6 ECCP mode	10	14
***EIF 512*-5** *Design interfacing of ADC, DAC, LCD, Keyboards etc. with PIC18F*			
05	**External Interfaces I:** 5.1 ADC Programming 5.2 DAC interfacing and programming 5.3 LCD interfacing and programming 5.4 Keyboard interfacing and programming 5.5 SPI Interfacing and MSSP module programming 5.5 DS 1306 RTC interfacing and programming	12	14
***EIF 512*-6** *Design interfacing of DC motor, Stepper motor, Relay etc*			
06	**External Interfaces II:** 6.1 Relay and Opto-isolator interfacing 6.2 Stepper motor interfacing 6.3 DC motor interfacing 6.1.1 L293 motor driver IC 6.1.2 Unidirectional Control 6.1.3 Bidirectional control 6.4 Bidirectional speed control of DC motor with CCP -PWM mode	10	12
	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.			

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

Topic No.	**Name of topic**	**Distribution of marks (Cognitive level-wise)**			**Course Outcome**	Total Marks
		Remember	**Understand**	**Applica--tion**		
1.	PIC Architecture	04	04	04	EIF512-1	12
2.	PIC Instruction & assembly Language Programming	04	06	04	EIF512-2	14
3.	I/O Programming	06	04	04	EIF512-3	14

	&Timer/counter of PIC					
04.	Serial Port & CCP,ECCP Programming of PIC	04	06	04	EIF512-4	14
05.	External Interfaces I	04	06	04	EIF512-5	14
06.	External Interfaces II	04	04	04	EIF512-6	12

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:

Practical Exercises and related skills to be developed:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Introduction to MPLAB software	To know the details of MPLAB software	EIF5-1
2	Addition & subtraction of 8 bit numbers	Understand the concept & use of instructions : MOVLW, ADDWF SUBWF, SUBFWB	EIF512-2
3	Addition & Subtraction of 16 bit numbers	Understand the concept & use of instructions : MOVLW, ADDWF, SUBWF, SUBFWB	EIF512-2
4	Addition of 2 digit & 4 digit BCD numbers	Understand the concept & use of instructions: DAW	EIF512-1-2
5	Multiplication of 8 bit number	Understand the concept & use of instructions : MOVLW, MULWF	EIF512-1-2
6	Block transfer in forward & reverse direction	Understand the concept of indirect addressing & use of instructions LFSR F, k	EIF512-1-2
7	Block exchange	Understand the concept of indirect addressing & use of instructions LFSR F, k	EIF512-1-2
8	Addition of hexadecimal number in array	Understand the concept of indirect addressing & use of instructions : MOVLW, ADDWF	EIF512-1-2
9.	Addition of BCD number in array	Understand the concept of indirect addressing & use of instructions : MOVLW, ADDWF, DAW	EIF512-1-2

10.	Find smallest number in array	Understand the concept of indirect addressing & use of instructions : MOVLW, BC,BNC	EIF512-1-2
11	Find an largest number in an array	Understand the concept of indirect addressing & use of instructions : MOVLW, BC, BNC	EIF512-1-2
12	Find positive & negative number in an array	Understand the concept of indirect addressing & use of instructions : BTFSC, BTf	EIF512-1-2
13	Study of keyboard interfacing	Understand the concept of matrix keyboard	EIF512-3-5
14	Study of dc motor interfacing	Understand the concept of dc motor interfacing	EIF512-3-6
15	Study of stepper motor interfacing.	To learn concept of stepper motor interfacing	EIF512-3-6

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 .

ii) Progressive Skill Test:

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

Criteria for Progressive Assessment of Practical and Skill Test

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Algorithm /Flowchart	05
	Program/Logic	05
Affective	Discipline and punctuality	05
	Decency and presentation	05
TOTAL		**25**

b) Criteria for assessment at semester end practical exam:
Every student has to perform one practical within 3 hours at semester end practical exam which shall be assessed as per following criteria.

Domain	Particulars	Marks out of 50
Cognitive	Technical Ability	05
	Logical Approach	05
Psychomotor	Presentation/ Algorithm and Flowchart	10
	Programming skill	10
Affective	Discipline and punctuality	10
	Decency and presentation	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

REFERENCE MATERIAL:

g) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Muhmed ali Mazidi	PIC Microcontroller & embedded system	Pearson edition publication.
2.	Peatmann	PIC microcontroller programming.	Tata McGraw-Hill

b) Websites

1) www.nptel.com
2) www.datasheet.com
3) www.pic.com

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COURSE ID:

Course Name : VLSI
Course Code : EIF 513
Course Abbreviation : FVLS

TEACHING AND EVALUATION SCHEME:

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

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

Evaluation Scheme:

Mode of Evaluation	**Progressive Assessment**		**Term End Examination**		**Total**
	Theory	Practical	Theory Examination	Practical	
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-I	
Marks	**20**	**--**	**80**	**50E**	**150**

* Assessment as per Pro-forma I

RATIONALE:

The influence of integrated-circuit technology in the past few years on our society has been pervasive, in area ranging from consumer products to business management to manufacturing control. The driving force behind this pervasiveness is that the functional capability of modern integrated circuitry has increased in scope and complexity exponentially with time over the past 20 years. The designers of modern integrated circuitry have continually endeavored to provide more computational speed with less dissipated electrical power and less circuit board area, while maintaining a low failure rate and an aggressive cost. The complexity and speed is finding ready application for VLSI systems in digital processing. Although silicon MOS-based circuitry will meet most requirements in such systems .The student can acquire knowledge in the design skill of combinational and sequential circuit with the help of VHDL and CMOS Logic circuit processing operation, student can use this knowledge as technician, supervisor and programmer in different sections of industry

COMPETENCY:

Acquire design skill of FPGA based digital circuits with the help of VHDL for variouselectronic applications.

Cognitive: Understandingarchitecture and design concepts based on FPGA/CPLD.

Psychomotor : WriteVHDL programs targeted towards FPGA for wide range of applications.

Affective: Develop the skill of i) Logical thinkin g abilityii) Design within time constraints.

COURSE OUTCOMES:

EIF 513-1 Understand fundamental issues VLSI technology and constraints imposed by it on design.

EIF 513-2 Explore the various construction processes in CMOS technology and implementation of finite state machine (FSM).
EIF 513-3 Understand the architectural details of FPGA/CPLD.
EIF 513-4 Develop the programming skills using VHDL language.
EIF 513-5 Designcombinational and sequential circuits using VHDL.
EIF 513-6 Develop the skills for designing digital circuits using different modeling styles in VHDL.

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 and Cos	Programme Outcomes POs and PSOs											
	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1Operate and Maintain	PSO 2 Supervision and Providing Solution
Competency: Develop the FPGA based systems for digital electronics applications	2	1	2	2	-	-	-	1	-	1	3	2
EIF 513-1	2	-	1	-	-	-	-	1	-	-	1	1
EIF 513-2	2	1	-	-	-	-	-	-	-	-	2	1
EIF 513-3	2	1	1	2	-	-	-	1	-	1	2	2
EIF 513-4	1	2	1	2	-	-	-	1	-	1	3	3
EIF 513-5	1	2	3	3	-	-	-	1	-	1	3	3
EIF 513-6	1	2	2	3	-	-	-	2	-	2	3	3

CONTENT:

A) THEORY : Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Marks
EIF 513-1 Understand fundamental issues VLSI technology and constraints imposed by it on design.			
01	**Very Large Scale Integration (VLSI) Technology** 1.1 CMOS Logic Basic Gates using NMOS 1.2 CMOS Logic Basic Gates using PMOS 1.3 Switch, ParamETFr measurements. 1.4 VLSI and its use in electronics	06	08
EIF 513-2 Explore the various construction processes in CMOS technology and implementation of finite state machine (FSM).			
02	**VLSI Design Concepts** 2.1 MOS circuit characterization and performance Estimation. 2.2 CMOS Technology- P Well process , N Well process, Twin tube process 2.3 Circuit elements - Resistors and capacitors 2.4 Finite state machines (FSM) 2.5 Moore and Mealey machines: Implementation of circuits usingMoore and Mealey machines.	12	16
EIF 513-3 Understand the architectural details of FPGA/CPLD.			
03	**Architecture of ASIC and PLD** 3.1 CPLD -Xilinx architecture, 3.2 3 Details of internal block diagram 3.3 Atmel series architecture, 3.4 Details of internal block diagram 3.5 Introduction to FPGA like Xilinx (FPGA), 3.6 Introduction to FPGA SPARTAN 3s series, 3.7 Introduction to FPGA Atmel.	14	16
	TOTAL:	32	40

Section-II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Marks
EIF 513-4 Develop the programming skills using VHDL language.			
04	**Hardware Description Language (HDL)** 4.1 Features of Verilog- 4.2 Entity, Architecture 4.3 Configuration 4.4 Package, Bus 4.5 Driver, Attributes, Process 4.6 Behavioral Modeling 4.7Sequential Processing 4.8 Data types, Configurations.	12	14
EIF 513-5 Designcombinational and sequential circuits using VHDL.			
05	**Simulation, Testing and Synthesis using VHDL** 5.1 Simulation Issues 5.2 Testing Issues 5.3 Synthesis Issues	08	14
EIF 513-6 Develop the skills for designing digital circuits using different modeling styles in VHDL.			
06	**Hardware Modeling examples (operation & block Testing)** 6.1 Different styles of modeling 6.2 Modeling simple elements 6.3 Modeling conditional operators 6.4 Modeling combinational logic 6.5 Modeling regular structure 6.6 Modeling synchronous logic	12	12
	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.

Specification Table For Question Paper of Theory Examination:

Section / Topic no.	Name Of the Topic	Distribution Of Marks (Level Wise)			Course Outcome	Total Marks
		Knowledge	Comprehension	Applications		
I/1	Very Large Scale Integration (VLSI) Technology	6	2	0	EIF 513-1	8
I/2	VLSI Design Concepts	4	8	4	EIF 513-2	16
I/3	Architecture of ASIC and PLD	8	4	4	EIF 513-3	16
II/4	Hardware Description Language (HDL)	4	2	8	EIF 513-4	14
II/5	Simulation, Testing and Synthesis using VHDL	2	4	8	EIF 513-5	14
II/6	Hardware Modeling examples (operation & block Testing)	2	2	8	EIF 513-6	12
				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 :

Laboratory experiments and related skills to be developed(based on any software or hardware as per availability)

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 Tutorial Exercise	Skills / Competencies to be developed	COURSE OUTCOMES
1.	Basic gates using VHDL (Any Two)	Design ,verify, test, Synthesize basic gates using VHDL (Any Two)	EIF 513-1
2.	synchronous counter using FPGA	Design ,verify, test, Synthesize synchronous counter using FPGA	EIF 513-5
3.	Scrolling of data on seven segment display using FPGA	Design ,verify, test, Synthesize Scrolling of data on seven segment display using FPGA	EIF 513-5

4.	Interface ADC-DAC using FPGA	Design ,verify, test, Synthesize interface ADC-DAC	EIF 513-6
5.	Generation of Ramp using DAC using FPGA	Verify and observe Ramp generated using DAC in FPGA	EIF 513-3,4,5
6.	Temperature sensing using ADC-DAC using FPGA	Design temperature sensing using ADC-DAC and verify output	EIF 513-3,4,5
7.	8:1 multiplexer using FPGA	Design ,verify, test, Synthesize 8:1 multiplexer using FPGA	EIF 513-3,4,5,6
8.	2:4 Decoder using FPGA	Design ,verify, test, Synthesize 2:4 Decoder using FPGA	EIF 513-3,4,5,6
9.	8:3 Encoder using FPGA	Design ,verify, test, Synthesize 8:3 Encoder using FPGA	EIF 513-3,4,5,6
10	4 bit ALU using FPGA	Design ,verify, test, Synthesize 4 bit ALU using FPGA	EIF 513-3,4,5,6
	Practical oriented miniproject	Group of 3students should build a mini project under guidance of teacher	EIF 513-1,2,3,4,5,6

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

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 practicle exam:

Every student shall be assessed as per following criteria

Domain	Particulars	Marks out of 50
Cognitive	Technical Ability	05
	Logical Approach	05
Psychomotor	Presentation/ Algorithm and Flowchart	10
	Programming skill	10
Affective	Discipline and punctuality	10
	Decency and presentation	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

REFERENCE MATERIAL:

a) Books / Codes

Reno.	Author	Title	Publisher
1	Douglas A. Pucknell, Kamran Eshraghian	Basic VLSI Design	Prentice Hall of India
2	Douglas Perry	VHDL	McGraw Hill
3	Xilinx	Xilinx Manual	www.xilinx.com
4	John f. Wakerly	Digital Design	Prentice Hall of India

b) Websites

1) *jntuh.ac.in/new/bulletin_board/**VLSI**.pdf*
2) http://www.xilinx.com
3) http://www.atmel.com

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(ANNEXURE)

(BRIDGE COURSE FOR DIRECT SECOND YEAR)

COURSE ID:

Course Name : BASIC ELECTRONICS

Course Abbreviation : BBTX

TEACHING AND EVALUATION SCHEME:

Prerequisites : NIL

Teaching Scheme:

Scheme Component	week	Hours
Theory	02 Week	12*2=24

Evaluation Scheme:-Writing assignment on each chapter consisting of 7 Questions.

RATIONALE:

All direct second year admitted electronics group students need, a grasp of certain fundamental principles and concepts are essential pre- requisitions for it. This subject deals with the most basic devices and circuits on which the further development of subject depends.

COURSE AIMS:

State the principles and operations of various electronic devices.

1) Use electronic devices in different circuits
2) To built up simple electronic circuits
3) Draw the characteristics of basic components like transistor etc.
4) Test transistors and FET.
5) Read the data sheets of transistors and FET.

CONTENTS:

A) THEORY: SECTION-I

Sr. No.	Topics	Teaching hours
1	**Rectifier, Filter** 1.0 Half wave rectifier - working,waveforms 1.1 Full wave rectifier - working,waveforms 1.2 Filter - study of shunt capacitor, seriesinductor, LC, Filter.,	**04**
2	**Bipolar Junction Transistor(BJT)** 2.0 Introduction. 2.1 Constructional features. 2.2 Operating principles of NPN 2.3 Transistor configurations & Modes of operation only CE configuration. 2.4 Specifications of transistor and relation between α & β	**05**
3	**Biasing of transistor and Single amplifier** 3.1 Q Point& stability 3.3.1 Voltage Divider Bias Circuit 3.2 Study of single stage amplifier. 3.2.1 Diagram 3.2.2 Working 3.2.3 Input Output Waveform	**05**

4	**Field Effect Transistor (FET)** 4.0 Classification of FET 4.1 Study of JFET 4.1.1 Construction details. 4.1.2 Working principle 4.1.3 Characteristics 4.1.4 JFET parameters and relation between μ,rd& gm 4.2 Comparison between JFET and BJT 4.3 Study of MOSFET:-Types,symbol,working principle, applications 4.4 Specifications of FET	**05**
5	**Regulated Power Supply** 5.1 Block diagram of Regulated power supply. 5.2 Zener diode as a voltage regulator Emitter follower regulator. 5.3 Study of IC 78xx & IC 79xx series of voltage regulators 5.4. Study of a LM317 internal block diagram and pinout features.	**05**

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	A. Motershed	Electronics Devices & Circuits	PHI Publication
2.	Malvino	Electronics Principles	McGraw Hill
3	V. K. Mehta	Principles of Electronics	S.Chand
4	G. K. Mithal	Applied Electronics	Khanna Publication
5	B. L. Theraja	Basic Electronics	S.Chand

c) Websites:

1) www.allaboutcircuits.com

2) www.electronicstheory.com

3) www.electronicstutorial.com