



GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Curriculum Document

CURRICULUM: MPECS-2020

(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 have 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 PBOs and feedback by the field and academic professionals. An overview of systematic and scientific mode of implementation and evaluation has also been pondered; consequently a practicable model of it has been achieved. It incorporates specific guidelines and assessment criteria for theory/practical/oral modes of evaluation. Specification table for each course has been provided to prepare question paper justifying meticulous coverage.

Curriculum philosophy:

The impact of globalization and rapid changes in the engineering science and technology has 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

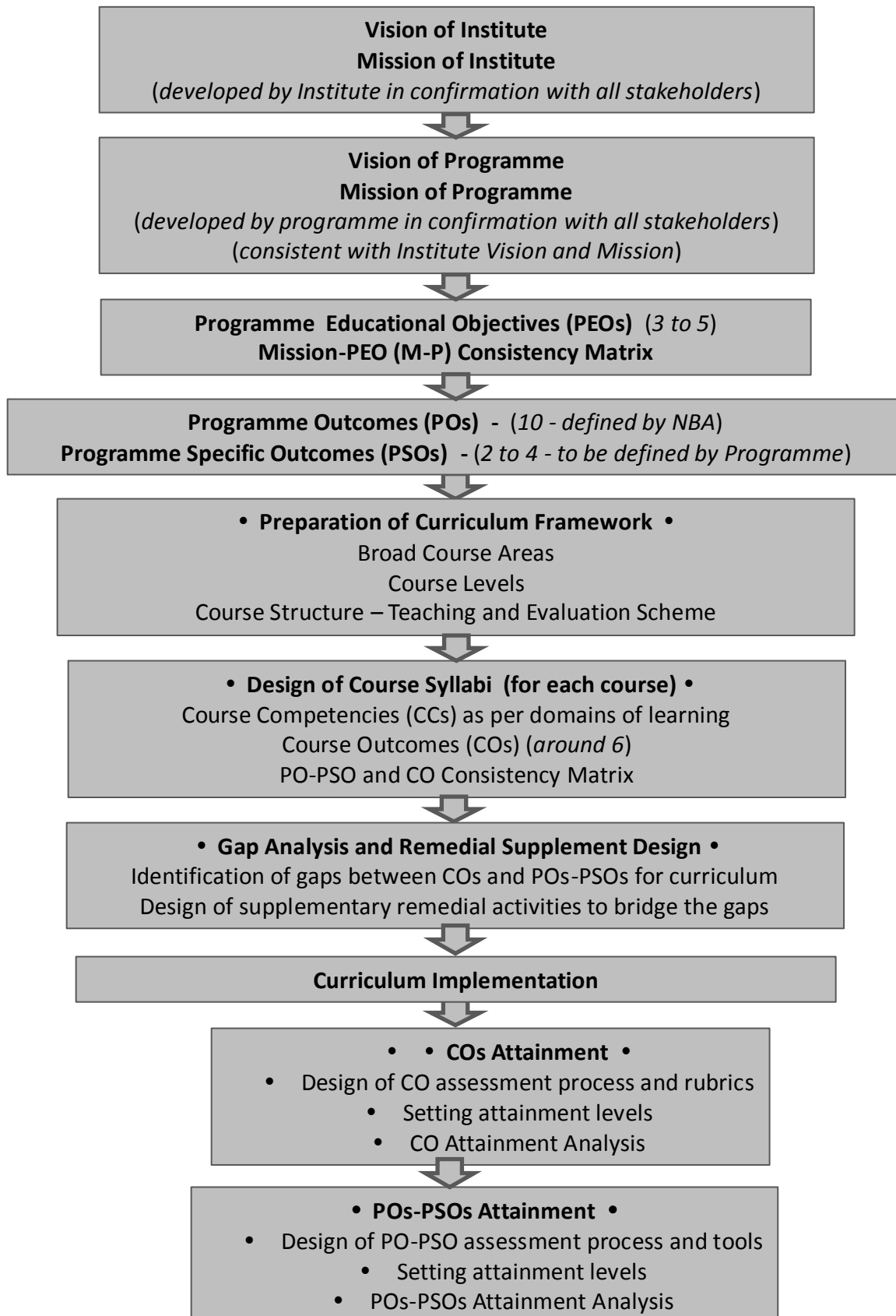
- To confirm implementation strategies
- To identify and to incorporate needs of industries
- To follow the policy directives
- To cope-up with social concerns
- To aim at personality development of students
- To allow future developments and challenges in emerging Science and technology.

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 is 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-2020 - It is the Curriculum of the Institute revised in the year 2020. It is applicable to the students admitted since 2020

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

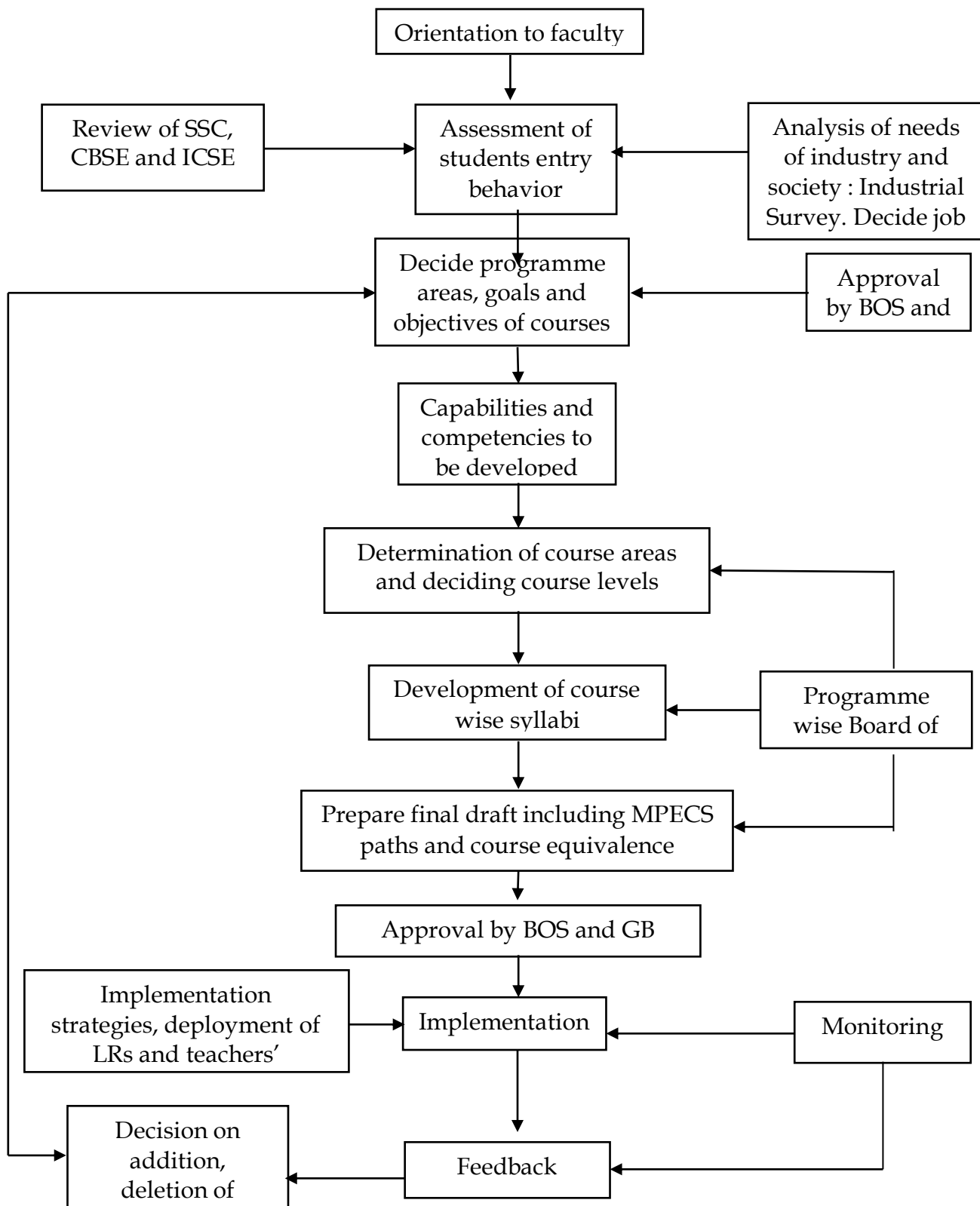
Programme Dean – He/she is the Head of Department of a Programme Department

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, MPECS-2020
- 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 the 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.

PEO4. Work as a responsible team member of an organization to achieve its goal or can be an individual entrepreneur.

Programme Outcomes (POs)

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and Engineering fundamentals and engineering specialization to solve the engineering problems.
2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.
3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. **Life-long learning:** Ability to analyse individual needs and engage in updating 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 Electronics engineering industr

3. OVERVIEW AND SALIENT FEATURES OF CURRICULUM: MPECS 2020

3.1 Overview of Curriculum MPECS 2020

Total Number of Credits		180
Number of courses offered	Total	42
	Theory	27
Maximum number courses in a semester		08
Total Maximum Marks		4500
Courses in Level IV and V	Number	16
	Credits	67
	Marks	1700
Courses in Level I	Number	10
	Credits	43
	Marks	1075
Courses in Level II	Number	06
	Credits	12
	Marks	225
Courses in Level III	Number	10
	Credits	58
	Marks	1500
Courses in Level IV	Number	07
	Credits	31
	Marks	825
Courses in Level V	Number	09
	Credits	36
	Marks	875
Ratio of TH:PR in %	Credit-wise	51:49 (60:40 to 50:50)
	Marks-wise	59:41
No. of Allied Courses		05
Elective Courses	No. of Elective courses	04
	Options per Elective Course	02
Number of Practical Exams	External	12
	Internal	24

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

3.2 Salient Features of Curriculum MPECS 2020

Addition and deletion of Courses as compared to previous MPECSs with justification:

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

➤ Following courses are newly added:-

1. Sports & Yoga (2 Credits, Non-Exam Course)
2. Introduction to IT System (4 Credits)
3. Environmental Science (Non-credit, Non-Exam - Audit course)
4. Essence of Indian Traditional Knowledge. (Non-credit, Non-Exam - Audit course)
5. Indian Constitution (Non-credit, Non-Exam - Audit course)
6. Internship 1 (4 weeks) (3 Credits)
7. Internship 2 (3 weeks) (2 Credits)
8. Entrepreneurship & Startups (4 Credits)
9. Consumer Electronics (Elective) (5 Credits)

➤ Following courses are deleted:

1. Generic Skills (4 Credits)
2. Computer fundamentals and Applications (3 Credits)
3. Higher Maths (Elective) (4 Credits)
4. Non-conventional Energy Resources (Elective) (4 Credits)
5. VLSI (Elective) (6 Credits)
6. Digital communication system (Elective) (5 Credits)
7. Digital system design(Elective) (5 Credits)
8. Energy conservation(Elective) (5 Credits)
9. Data communication system(Elective) (5 Credits)

➤ Major modifications in Course Contents with justification:

To adapt OBE for the courses-

1. Under term end examination scheme –
 - a. Term work assessment is removed for all the courses
 - b. For all the courses term end practical assessment (PR) scheme is adopted
2. Electronics Circuit Design course made mandatory
3. Instead of PIC Microcontroller course is Advance Microcontrollers course is introduced
4. 8051 Microcontroller course is renamed as Microcontrollers
5. Instrumentation course is made elective course.

6. Theory credits of following courses are reduce from 4 to 3
 - a. Programmabe Logic Control
 - b. Power Electronics I
 - c. Power Electronics II
 - d. Principles of Control System
 - e. Engineering Physics
 - f. Engineering Chemistry
 - g. Embedded System
 - h. Digital Techniques and Applications
 - i. Linear Integrated Circuits
 - j. Circuit & Networks
 - k. Microcontroller
 - l. Electronics Circuit Design
7. Practical credits of Engineering Graphics course are reduce from 4 to 2
8. Micro projects are added in the programme core courses from 3rd semester onward
9. Practical credits of the following courses increased from 2 to 4
 - i) Applied Electronics
 - ii) Linear Integrated circuits
 - iii) Microcontroller
 - iv) C programming

➤ **Changes in Implementation Strategy and Treatment:**

1. In line with the policies of MSBTE there will be no backlog subjects for direct second year admitted students. Instead a bridge course basic electronics is added without credits with a curriculum to be covered in 24 theory lectures
2. Outcome based curriculum has been designed in compliance with new NBA SAR
3. To make MPECS 2020 curriculum comply with AICTE model curriculum the following modifications are done
 - a. Three non credit audit courses are introduced
 - i. Environmental Science
 - ii. Essence of Indian Traditional Knowledge
 - iii. Indian Constitution
 - b. Internship 1 and 2 are introduced as credit courses with total 5 credits
 - c. Introduction of new credit courses
 - i. Sports & Yoga
 - ii. Entrepreneurship and Development

4. CURRICULUM STRUCTURE: TEACHING AND EXAMINATION SCHEME (LEVEL WISE)

Programme: INDUSTRIAL ELECTRONICS											
TEACHING AND EXAMINATION SCHEME (LEVEL-WISE): MPECS 2020											
Sr.No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme		
						TH	PR / DRG /Tutorial	Credits	Theory		Practical
									ESE	PA	ESE PR
	Level 1: Foundation Courses										
1	Electronic Components and Applications	EIG101	GECA	1	--	4	2	6	80	20	50I
2	Engineering Physics	CCG102	GPHB	1	--	3	2	5	80	20	50I
3	Basic Electronics	EIG103	GBTX	1	--	4	2	6	80	20	50E
4	Engineering Chemistry	CCG104	GCHB	1	--	3	2	5	80	20	50I
5	Basic Mathematics	CCG105	GBMT	1	--	3	1	4	80	20	-
6	Basic Electrical Engg	EIG107	GBEE	1	--	3	2	5	80	20	50I
7	Engineering Graphics	CCG109	GEGR	1	--	2	2	4	-	-	75E
8	Workshop Practice	CCG114	GWSD	1	--	0	2	2	-	-	50I
9	Sports & Yoga	CCG117	GSPY	1	--	0	2	2	-	-	-
10	Engineering Mathematics	CCG118	GEMB	1	CCG105	3	1	4	80	20	-
						25	18	43	560	140	375
	Level 2 : Life Skills, Professional Skills and Non credit Audit Courses										
11	Introduction to IT Systems	CCG201	GITS	2	--	2	2	4	-	-	50I
12	Communication Skills	CCG203	GCMS	2	--	3	2	5	40	10	50I
13	Environmental Science	CCG204	GEVS	2	--	2	0	0	-	-	-
14	Essence of Indian Traditional knowledge	CCG205	GITK	2	--	2	0	0	-	-	-
15	Indian Constitution	CCG206	GINC	2	--	2	0	0	-	-	-
16	Professional practices	IEG 207	GPRP	2	---	1	2	3	-	-	75I
						6	6	12	40	10	175
	Level 3: Basic Technology Courses										
17	Applied Mathematics	EIG301	GAMT	3	CCG118	3	1	4	80	20	-
18	Applied Electronics	EIG302	GATX	3	EIG103	3	4	7	80	20	75E
19	Electronic Measuring Instruments	EIG303	GEMI	3	--	3	2	5	80	20	50I
20	C Programming	EIG304	GCPR	3	--	2	4	6	-	-	100E

Programme: INDUSTRIAL ELECTRONICS											
TEACHING AND EXAMINATION SCHEME (LEVEL-WISE): MPECS 2020											
Sr.No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme		
						TH	PR / DRG / Tutorial	Credits	Theory		Practical
									ESE	PA	
21	Analog Communication	EIG305	GACM	3	--	3	2	5	80	20	50I
22	Digital Techniques & application	IEG306	GDTA		--	3	4	7	80	20	75E
23	Linear Integrated Circuits	EIG307	GLIC	3	--	3	4	7	80	20	75E
24	Circuits & Networks	EIG308	GCKN	3	--	3	2	5	80	20	50I
25	Microcontrollers	EIG309	GMCS	3	EIG306	3	4	7	80	20	75E
26	Electrical Machines	IEG310	GEMC	3		3	2	5	80	20	50I
						29	29	58	720	180	600
Level 4: Applied Technology Courses											
27	Simulation Software	EIG401	GSIM	4	--	0	4	4	-	-	50I
28	Embedded Systems	EIG402	GEMS	4	EIG309	3	2	5	80	20	50E
29	Electronics Circuit Design	EIG403	GECD	4	--	3	2	5	80	20	50E
30	Project I	EIG404	GPR1	4	--	0	2	2	-	-	50I
31	Power Electronics 1	IEG405	GPE1	4	--	3	2	5	80	20	50I
32	Principles of Control Systems	EIG406	GPCS	4	--	3	2	5	80	20	25I
33	Elective- 1			4	--	3	2	5	80	20	50I
						15	16	31	400	100	325
Level 5: Management and Diversified Technology Courses											
34	Entrepreneurship Development	CCG501	GESU	5	--	2	2	4	-	-	50E
35	Internship – 1 (4 weeks after 4th Semester)	CCG502	GINO	5	--	0	0	3	-	-	50E
36	Internship – 2 (3 weeks after 5th Semester)	CCG503	GINT	5	--	0	0	2	-	-	50E
37	Power electronics II	IEG504	GPE2	5	--	3	2	5	80	20	50I
38	PLC	IEG505	GPLC	5	--	3	2	5	80	20	25I
39	Project-II	EIG506	GPR2	5	EIG404	0	4	4	-	-	75E
40	Elective- 2			5	--	3	2	5	80	20	25I
41	Elective- 3			5	--	3	0	3	80	20	-
42	Elective- 4			5	--	3	2	5	80	20	50I
						17	14	36	400	100	375

Note:

- 1) Credits of Internship1 and 2 (2+3=5) not shown under TH or PR credits
- 2) Number of TH hours= 98 (including 6 Hours of Non-credit courses), so total TH credits = 98-6 = 92
- 3) Number of PR hours= 83, Number of PR credits = 83
- 4) Total number of credits = 92 (TH) + 83(PR) + 5(Internship 1 & 2) = 180

OPTIONAL COURSES FOR ELECTIVES

Sr.No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme			
						TH	PR / DRG /Tutorial	Credits	Theory		Practical	
									ESE	PA	ESE	
											PR	OR
	Elective – 1											
1	Optoelectronics	IEG 407	GOPT	4	--	3	2	5	80	20	50I	-
2	Robotics	IEG408	GROB	4	--	3	2	5	80	20	50I	-
	Elective – 2											
3	Consumer Electronics	EIG507	GCEN	5	--	3	2	5	80	20	25I	-
4	Instrumentation	EIG508	GINs	5	--	3	2	5	80	20	25I	-
	Elective – 3											
5	Industrial Organization	EIG509	GIOM	5	--	3	-	3	80	20	-	-
	Management											
6	Marketing Management	EIG510	GMRM	5	--	3	-	3	80	20	-	-
	Elective – 4											
7	Advance Microcontrollers	EIG512	GADM	5	--	3	2	5	80	20	50I	-
8	Automotive Electronics	EIG513	GAEL	5	--	3	2	5	80	20	50I	-

5. PATH WISE COURSE STRUCTURE

Path 1: Students admitted to First Year – X Standard Pass Outs

PATH-WISE COURSE STRUCTURES: MPECS 2020												
Path-1 : Students admitted to First Year - X std. pass outs												
Sr. No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme			
						TH	PR / DRG / Tutorial	Credits	Theory		Practical	
									ESE	PA	ESE	
											PR	OR
Semester 1												
1	Electronic Components and Application	EIG101	GECA	1	--	4	2	6	80	20	50I	-
2	Engineering Physics	CCG102	GPHB	1	--	3	2	5	80	20	50I	-
3	Basic Mathematics	CCG105	GBMT	1	--	3	1	4	80	20	-	-
4	Engineering Graphics	CCG109	GEGR	1	--	2	2	4	-	-	75E	-
5	Workshop Practice	CCG114	GWSD	1	--	0	2	2	-	-	50I	-
6	Introduction to IT Systems	CCG201	GITS	2	--	2	2	4	-	-	50I	-
						14	11	25				
Semester 2												
7	Basic Electronics	EIG103	GBTX	1	--	4	2	6	80	20	50E	-
8	Engineering Chemistry	CCG104	GCHB	1	--	3	2	5	80	20	50I	-
9	Basic Electrical Engg	EIG107	GBEE	1	--	3	2	5	80	20	50I	-
10	Sports & Yoga	CCG117	GSPY	1	--	0	2	2	-	-	-	-
11	Engineering Mathematics	CCG118	GEMB	1	CCG105	3	1	4	80	20	-	-
12	Communication Skills	CCG203	GCMS	2	--	3	2	5	40	10	50I	-
13	Environmental Science	CCG204	GEVS	2	--	2	0	0	-	-	-	-
						16	11	27				
Semester 3												
14	Applied Mathematics	EIG301	GAMT	3	CCF118	3	1	4	80	20	-	-
15	Applied Electronics	EIG302	GATX	3	EIG103	3	4	7	80	20	75E	-
16	Electronic Measuring Instruments	EIG303	GEMI	3	--	3	2	5	80	20	50I	-
17	C Programming	EIG304	GCPR	3	--	2	4	6	-	-	100E	-
18	Analog Communication	EIG305	GACM	3	--	3	2	5	80	20	50I	-
19	Digital techniques & application	IEG306	GDTA	3	--	3	4	7	80	20	75E	-
						17	17	34				

Curriculum MPECS 2020
Diploma in Industrial Electronics

Semester 4												
20	Essence of Indian Traditional Knowledge	CCG205	GIKT	2	--	2	0	0	-	-	-	-
21	Professional Practices	IEG207	GPRP	2	--	1	2	3	-	-	75I	-
22	Linear Integrated Circuits	EIG307	GLIC	3	--	3	4	7	80	20	75E	
23	Circuit & Network	EIG308	GCKN	3	--	3	2	5	80	20	50I	
24	Microcontrollers	EIG309	GMCS	3	EIG306	3	4	7	80	20	75E	-
25	Electrical Machines	IEG310	GEMC	3	--	3	2	5	80	20	50I	
26	Simulation Software	EIG401	GSIM	4	--	0	4	4	-	-	50I	
						13	18	31				
Semester 5												
27	Indian Constitution	CCG206	GINC	2	--	2	0	0	-	-	-	-
28	Embedded Systems	EIG402	GEMS	4	--	3	2	5	80	20	50E	-
29	Electronics Circuit Design	EIG403	GECD	4	--	3	2	5	80	20	50E	-
30	Project I	EIG404	GPR1	4	--	0	2	2	-	-	50I	-
31	Internship – 1 (4 weeks after 4th sem)	CCG502	GINO	5	--	0	0	3	-	-	50E	-
32	Power Electronics 1	IEG405	GPE1	4	--	3	2	5	80	20	50I	-
33	Elective– 1			4	--	3	2	5	80	20	50I	-
34	Elective– 2			5	--	3	2	5	80	20	25I	-
						15	12	30				
Semester 6												
35	Power Electronics II	IEG504	GPE2	4	--	3	2	5	80	20	50I	
36	Principles of Control Systems	EIG406	GPCS	4	--	3	2	5	80	20	25I	
37	Entrepreneurship Development	CCG501	GESU	5	--	2	2	4	-	-	50E	-
38	Internship – 2 (3 weeks after 5th sem)	CCG503	GINT	5	--	0	0	2	-	-	50E	-
39	PLC	IEG505	GPLC	5	--	3	2	5	80	20	25I	
40	Project-II	EIG506	GPR2	5	EIG404	0	4	4	-	-	75E	-
41	Elective– 3			5	--	3	0	3	80	20	-	-
42	Elective– 4			5	--	3	2	5	80	20	50I	-
						17	14	33				
						92	83	180	2120	530	1850	0

Path 2: Students admitted directly to Second Year with XII Science (PCM/PCMB), XII (Tech.), XII (Voc), ITI

Semester 3												
14	Applied Mathematics	EIG301	GAMT	3	CCF118	3	1	4	80	20	-	-
15	Applied Electronics	EIG302	GATX	3	EIG103	3	4	7	80	20	75E	-
16	Electronic Measuring Instruments	EIG303	GEMI	3	--	3	2	5	80	20	50I	-
17	C Programming	EIG304	GCPR	3	--	2	4	6	-	-	100E	-
18	Analog Communication	EIG305	GACM	3	--	3	2	5	80	20	50I	-
19	Digital techniques & application	IEG306	GDTA	3	--	3	4	7	80	20	75E	-
						17	17	34				
Semester 4												
20	Essence of Indian Traditional Knowledge	CCG205	GIKT	2	--	2	0	0	-	-	-	-
21	Professional Practices	IEG207	GPRP	2	--	1	2	3	-	-	75I	-
22	Linear Integrated Circuits	EIG307	GLIC	3	--	3	4	7	80	20	75E	
23	Circuit & Network	EIG308	GCKN	3	--	3	2	5	80	20	50I	
24	Microcontrollers	EIG309	GMCS	3	EIG306	3	4	7	80	20	75E	-
25	Electrical Machines	IEG310	GEMC	3	--	3	2	5	80	20	50I	
26	Simulation Software	EIG401	GSIM	4	--	0	4	4	-	-	50I	
						13	18	31				
Semester 5												
27	Indian Constitution	CCG206	GINC	2	--	2	0	0	-	-	-	-
28	Embedded Systems	EIG402	GEMS	4	--	3	2	5	80	20	50E	-
29	Electronics Circuit Design	EIG403	GECD	4	--	3	2	5	80	20	50E	-
30	Project I	EIG404	GPR1	4	--	0	2	2	-	-	50I	-
31	Internship – 1 (4 weeks after 4th sem)	CCG502	GINO	5	--	0	0	3	-	-	50E	-
32	Power Electronics 1	IEG405	GPE1	4	--	3	2	5	80	20	50I	-
33	Elective– 1			4	--	3	2	5	80	20	50I	-
34	Elective– 2			5	--	3	2	5	80	20	25I	-
						15	12	30				
Semester 6												
35	Power Electronics II	IEG504	GPE2	4	--	3	2	5	80	20	50I	
36	Principles of Control Systems	EIG406	GPCS	4	--	3	2	5	80	20	25I	
37	Entrepreneurship Development	CCG501	GESU	5	--	2	2	4	-	-	50E	-
38	Internship – 2 (3 weeks after 5th sem)	CCG503	GINT	5	--	0	0	2	-	-	50E	-
39	PLC	IEG505	GPLC	5	--	3	2	5	80	20	25I	
40	Project-II	EIG506	GPR2	5	EIG404	0	4	4	-	-	75E	-
41	Elective– 3			5	--	3	0	3	80	20	-	-
42	Elective– 4			5	--	3	2	5	80	20	50I	-
						17	14	33				
						92	83	180	2120	530	1850	0

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 cours

6. EXEMPTIONS FOR COURSES

Eligibility for Exemptions for First and Second Semester Courses of MPECS-2020 for students admitted on X-pass basis

Sr No	Name of Course	Course Code	Whether eligible for exemption? (Yes / No)				
			XII Science	XII Tech.	XII MCV C	XII Voc.	ITI
1	Engineering Physics (CE/ME/ MT)	CCG101	YES	YES	No	No	No
2	Engineering Physics (EE/IE/ET/IT)	CCG102	YES	YES	No	No	No
3	Engineering Chemistry (CE/ME /MT)	CCG103	No	No	No	No	No
4	Engineering Chemistry (EE/IE/ET/IT)	CCG104	No	No	No	No	No
5	Basic Mathematics	CCG105	YES	YES	No	YES	No
6	Engineering Mathematics (CE/ME/MT)	CCG106	YES	YES	No	YES	No
7	Engineering Drawing-1 (CE/ME/MT)	CCG107	No	YES	No	No	No
8	Engineering Drawing-2 (CE/ME/SM/MT)	CCG108	No	YES	No	No	No
9	Engineering Graphics (EE/IT/IE/ET)	CCF109	No	YES	No	No	No
10	Applied Mechanics	CCG110	No	No	No	No	No
11	Workshop Practices–1 (CE)	CCG111	No	YES	YES	YES	YES
12	Workshop Practices–1 (ME/ MT)	CCG112	No	YES	YES	YES	YES
13	Workshop Practices (EE)	CCG113	No	YES	YES	YES	YES
14	Workshop Practices (IE / ET)	CCG114	No	YES	YES	YES	YES
15	Workshop Practices -2 (CE)	CCG115	No	YES	YES	YES	YES
16	Workshop Practices -2 (ME / MT)	CCG116	No	YES	YES	YES	YES
17	Engineering Mathematics (EE/IT/IE/ET)	CCG118	YES	YES	No	YES	No
18	Communication Skills in English	CCG203	No	No	No	No	No

Note :

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

(2) Students seeking exemption for any other subjects should contact Academic Coordinator / Controller of Examinations

7. COURSE EQUIVALENCE FOR PREVIOUS MPECSs

SN	MPECS-2001	MPECS-2006	MPECS-2010	MPECS-2013	MPECS-2016	MPECS-2020
1	101-Generic Skill	R101-Generic Skill	X101-Generic Skill	CCE201-Gen. Skills	CCF201-Gen. Skills	----
2	103- applied Physics 1	R103- applie Physics 1	X102-Basic Physics	CCE102-Engineering Physics	CCF102-Engineering Physics	CCG102-Engineerin g Physics
3	105- Applied Chemistry 1	R105- Applied Chemistry 1	X103- Applied Chemistry	CCE104-Engineering Chemistry	CCF104-Chemistry of Engineering materials	CCG104-Engineerin g Chemistry
4	107-applied Mathematics-1	R107-Basic Mathematics	X104-Basic Mathematics	CCE105-Basic Mathematics	CCF105-Basic Mathematics	CCG105-Basic Mathemati cs
5	109-Engg. Drawing-1	R109-Engg. Drawing-1	IX/EJ 105-Engineering Drawing	----	----	----
6	102-Comm.Skills	R102-Comm.Skills	X106-Comm.Skills	CCE202-Comm.Skills	CCF202-Comm.Skills	CCG203-Com.Skills in English
7	113-Workshop Practice 1	R113-Workshop Practice 1	IX/EJ107-Basic workshop practice	CCF114-Workshop Practice	CCF114-Workshop Practice	CCG114-Workshop Practice
8	104-applied physics-II	R104-applied physics-II	X108 -Engg. Science	---	---	---
8	106-applied chemistry	R106-chemistry of engineering material	X108 -Engg. Science	---	---	---
9	4206 - Electronic workshop	IE206-Electronic workshop	IX/EJ 109-Electronic Components and Applications	IEE/ETE103-Electronic Components and Applications	EIF 101-Electronics Components and Applications	EIG101-Electronics Componen ts and Applicatio ns
10	108-applied mathematics II	R108-Engg Mathematics	X110-Engineering Mathematics	CCE106-Engineering Mathematics	CCF 106-Engineering Mathematics	CCG118-Engineerin g Mathemati cs

11	111- fundamental of engineering I	----	----	----	----	----
12	111- fundamental of engineering II	----	----	----	----	----
13	115- Intro to computers	R111- Computer Fundamental & Application	----	IEE/ETE108- Computer Fundamental & Application	EIF 108- Computer Fundamental & Application	CCG201- Introductio n to IT System
14	4202- Electronics Devices and Circuits	IE202- Electronics circuit & devices	IX/EJ111 Basic Electronics	IEE/ETE103- Basic Electronics	EIF 103- Basic Electronics	EIG103- Basic Electronics
15	116 - Applied Mechanics	R112 - Applied Mechanics	-----	-----	-----	-----
16	-----	-----	-----	EIF107- Basic Electrical Engg	EIF 107- Basic Electrical Engg	EIG107- Basic Electrical Engg
17	-----	-----	-----	CCE 109- Engineering Graphics	CCF 109- Engineering Graphics	CCG109- Engineerin g Graphics
18	-----	-----	IX/EJ112 Circuit & Network	IEE/ETE308 Circuit & Network	EIF 308- Circuit & Network	EIG308- Circuit & Network
19	----	----	----	CCE203- Professional Practices	CCF203- Professional Practices	EIG207- Profession al Practices
20	-----	----	----	CCE204- Environmental Studies	--	CCG204- Environme ntal Science
21	110- Engineering Drawing -II	R110- Engineering Drawing -II	---	---	---	----

22	4301- Applied Electronics	IE202- Applied Electronics	IE202- Applied Electronics	IEE/ETE302- Applied Electronics	EIF 302- Applied Electronics	EIG302- Applied Electronics
23	4308- I.C.Applications	IE308- I.C.Applications	----	----	----	----
24	4407- Industrial Process Control	IE407- Industrial Process Control	IX 401- Industrial Automation	----	----	----
25	4310- Microelectronics	IE310- Microelectronics	----	----	----	----
26	4204- Electronics Measuring Instruments	IE204- Electronics Measuring Instruments	IX/EJ203- Electronics Measuring Instruments	IEE/ETE303- Electronics Measuring Instruments	EIF 303- Electronics Measuring Instruments	EIG303- Electronics Measuring Instruments
27	4401-C Programming	IE110-C Programming	IX/EJ204 C Programming	IEE/ETE304-C Programming	EIF 304-C Programming	EIG304-C Programming
28		IE205- Electrical Engineering	---	---	----	----
29	4209- Principles of communication system	IE209- Principles of communication system	IX/EJ205- Analog Communication	IEE/ETE305- Analog Communication	EIF 305- Analog Communication	EIG305- Analog Communication
30	4207- Linear Integrated Circuits	IE207- Linear Integrated Circuits	IX/EJ206- Linear Integrated Circuits	IEE/ETE307- Linear Integrated Circuits	EIF 307- Linear Integrated Circuits	EIG307- Linear Integrated Circuits
31	4208- Digital Techniques	IE208- Digital Techniques	IX/EJ207- Digital Techniques	IEE/ETE306- Digital Techniques & Application	EIF 306- Digital Techniques & Application	IEG306- Digital Techniques & Application

32	----	----	----	IEE310- Electrical machines	ETF310- Electrical machines	ETG310- Electrical machines
33	4303- Microprocessor	IE408- Microprocessor I	IX/EJ209- Microprocess or & Interfacing	IEE/ETE309- Microprocessor & Interfacing	----	----
34	4303- Microprocessor	IE409- Microprocessor I	IX/EJ209- Microprocess or & Interfacing	IEE/ETE309- Microprocessor & Interfacing	----	----
35	4211- Development of softskills	IE211- Project & Seminar-I	---	IEE/ETE503- Project-1	EIF 503- Project-1	EIG404- Project-1
36	4410- Television Engineering	IE410- Television Engineering	---	---	---	---
37	4411- Relational Database Management Systems	IE 411- Relational Database Management Systems	----	----	----	----
38	0222- Electrical CKTS. & M\Cs	R222- Electrical CKTS. & M\Cs	---	---	---	---
39	0223- Basic Electronics	R223- Basic Electronics	---	---	---	---
40	0227- Non Conv Energy Sources	R227- Non Conv Energy Sources	---	IEE/ETE311- Non Conv Energy Sources	EIF 311- Non Conv Energy Sources	---
41	0228- Higher Maths	R228- Higher Maths	IX/EJ210- Higher Engineering Maths	IEE/ETE312- Higher Mathematics	EIF 312- Higher Mathematics	---
42	4302- Industrial Electronics	IE302- Industrial Electronics	IX/EJ211- Industrial Electronics	IEE/ETE401- Power Electronics-1	EIF 401- Power Electronics-1	IEG405- Power Electronics

						-1
43	4304- Power Electronics	IE 304 - Power Electronics	IX301- Power electronics	IEE 511- Power electronics 2	IEF511- Power electronics 2	IEG 504- Power electronics 2
44	4409- Microcontroller and their applications	IE303- 8051 Microcontroller	IE302- 8051 Microcontroller	IEE/ETE402- 8051 Microcontroller	EIF 309- 8051 Microcontrollers	EIG309- Microcontrollers
45	4210- Principles of Control System	IE210- Control System	IE303- Feedback Control System	IEE/ETE404- Principles of Control System	EIF 404- Principles Of Control System	EIG406- Principles Of Control System
46	4307- Instrumentation	IE306- Instrumentation	IX/EJ304- Instrumentation	IEF403- Instrumentation	IEE403- Instrumentation	IEG508- Instrumentation
47	----	----	IX/EJ 305- Optoelectronics	IEE305 Optoelectronics	IEF305 Optoelectronics	IEG407 Optoelectronics
48	4309- Medical Electronics	ET309- Medical Electronics	EJ306- Medical Electronics	---	---	---
49	----	IE 312 - Industrial Drives	IX 307 - Industrial Drives	----	----	----
50	4306 - Electronics Circuit Design	IE311- Electronics Circuit Design	IE308- Electronics Circuit Design	IEE/ETE406- Electronics Circuit Design	EIF 406- Electronics Circuit Design	EIG403- Electronics Circuit Design
51	---	---	IX/EJ 409- Data communication & Networking	---	---	---
52	---	---	IX410- Process Instrumentation	---	---	---

53	---	---	---	IEE511- PLC & drives	IEF502- PLC	IEG505- PLC
54	---	IE402- PC Hardware & Maintenance	IX 309 Computer H/W & maintainance	----	----	----
55	---	IE403- Introduction To Matlab & OrCAD	IE402- Introduction To Matlab & OrCAD	IEE/ETE405- Simulation Software	EIF 405- Simulation Software	EIG401- Simulation Software
56	4305- Project & Seminar-II	IE305- Project & Seminar-II	IE403-Project	IEE/ETE504- Project II	EIF 504- Project II	EIG506- Project II
57	4404- Industrial Organization & Management	IE404- Industrial Organization & Management	IE404- Industrial Organization & Management	IEE/ETE508- Industrial Organization & Management	CCF 501 - Industrial Organization & Management	EIG509 - Industrial Organization & Management
58	4405- Marketing Management	IE405- Marketing Management	IE405- Marketing Management	IEE/ETE509- Marketing Management	EIF 509- Marketing Management	EIG 510- Marketing Management
59	4406- Project Management	IE406- Project Management	-----	----	----	----
60	4307- Entrepreneurship	IE307- Entrepreneurship Development	IE406- Entrepreneurship Development	IEE/ETE510- Entrepreneurship Development	EIF 510- Entrepreneurship Development	CCG501- Entrepreneurship development
61	4408- Advanced microprocessors & OS	-----	----	----	----	----
62	-----	-----	IX/EJ 407- VLSI Design	IEE/ETE 407- VLSI	EIF 513-VLSI	----
63	-----	ET408- Embedded System	IXEJ 408- Embedded System	IEE 502Embedded	EIF 402- Embedded Systems	EIG 402- Embedded Systems

64	4412- Electronic System Design	IE412- Electronic System Design	IX411- Digital system design	IEE 407-- Digital system design	IEF 407-- Digital system design	----
65	----	----	IX412- Advanced Industrial Electronics	IEE506- Advanced Industrial Electronics	----	----
66	4413- Electronic Laboratory Equipment Maintinance	IE413- Electronic Laboratory Equipment Maintinance	IX413- Electronic Laboratory Equipment Maintinance	----	----	----
66	4414- Radio & TV servicing	IE414- Radio & TV servicing	----	----	----	----
67	----	----	IX/EJ414- Computer Networking	----	----	----
68	4402- Computer Applications	IE 415- Visual Basic & MS ACCESS	IX415- Visual Basic & MS ACCESS	----	----	----
69	----	----	----	IEE408- Advanced Communicatin System	IEF408- Data Communicatin System	----
70	-----	-----	-----	-----	-----	EIG507 Consumer Electronics
71	-----	-----	IXEJ414- Computer Networking	-----	----	----
72				IEE507- Robotics	IEF506 Robotics	IEG408- Robotics

73	-----	-----	-----	IEE 512-PIC Microcontrolle r	EIF 512-PIC Microcontrolle r	IEG512- Advance Microcontr ollers
74	-----	-----	-----	----	----	EIG513- Automotiv e Electronics
75	-----	-----	-----	----	----	CCG117- Sports and Yoga
76		----	----			CCG205- Essence of Indian Traditional Knowledge
77	-----	-----	-----	-----	-----	CCG206- Indian Constitutio n
78	-----	-----	-----	-----	-----	CCG502- Internship – 1 (4 weeks after 4th Semester)
79	-----	-----	-----	-----	-----	CCG503- Internship – 2 (3 weeks after 5th semester
80	-----	----	----	----	----	EIG513- Automotiv e Electronics
81	-----	----	----	----	----	EIG 507- Consumer Electronics

8. PROFORMAS FOR EVALUATION OF ORALS AND PRACTICALS

PROFORMA - I

GOVERNMENT POLYTECHNIC, KOLHAPUR

Performance for Final Assessment of PRACTICAL / ORAL

FOR COURSES OF FIRST AND SECOND SEMESTER (Without Micro-Projects)

By Internal & External Examiner

(For Course having ONLY PRACTICAL / ORAL)

Course Code & Course Name:-

Programme:-

Summer/Winter Exam-20 Date:-

[illegible]

Internal Examiner

Signature:-

Name:-

Institute:-

External Examiner

Signature:-

Name:-

Institute:-

PROFORMA-II
GOVERNMENT POLYTECHNIC, KOLHAPUR
Performance for Final Assessment of PRACTICAL / ORAL
FOR COURSES OF FIRST AND SECOND SEMESTER (Without Micro-Projects)
By Internal Examiner
(For Course having ONLY PRACTICAL / ORAL)

Course Code & Course Name:-_____

Programme:-

Summer/Winter Exam-20 Date:-

[illegible]

Internal Examiner

Signature:-

Name:-

Institute:-

PROFORMA - III
GOVERNMENT POLYTECHNIC, KOLHAPUR
Performance for Final Assessment of PRACTICAL / ORAL
FOR COURSES OF THIRD TO SIXTH SEMESTER (With Micro-Projects)
By Internal & External Examiner
(For Course having ONLY PRACTICAL / ORAL)

Course Code & Course Name:-

Programme:-

Summer/Winter Exam-20 Date:-

[illegible]

Internal Examiner

Signature:-

Name:-

Institute:-

External Examiner

Signature:-

Name:-

Institute:-

PROFORMA-IV
GOVERNMENT POLYTECHNIC, KOLHAPUR
Performance for Final Assessment of PRACTICAL / ORAL
FOR COURSES OF THIRD TO SIXTH SEMESTER (With Micro-Projects)
By Internal Examiner
(For Course having ONLY PRACTICAL / ORAL)

Course Code & Course Name:-_____

Programme:-

Summer/Winter Exam-20 Date:-

[illegible]

Internal Examiner

Signature:-

Name:-

Institute:-

SECTION – II

SYLLABI OF COURSES

(LEVEL WISE)

LEVEL- I

FOUNDATION COURSES

COURSE ID:

Course Name : ELECTRONIC COMPONENTS AND APPLICATIONS
Course Code : EIG101
Course Abbreviation : GECA

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 *	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (ii) One PST of 25 marks	One paper (3 hour)	Term End Practical Exam (03 hours)	
Marks	20	--	80	50 I	150

I* Assessment as per pro-forma II

I – Internal Examination

RATIONALE:

This course is intended to help the students to get clear idea of fundamentals of electronic components and develop practical skills in using various types of electronic components employed in electronic industries. It will also make the students familiar with the suitability of various electronics components for different applications. More over this course is intended to develop skills of testing components that will be really needed for the project and setting up of many experiments in other basic and applied technology courses.

COMPETENCY:

Use electronic components in electronic equipment.

Cognitive: Identify and illustrate the use of various electronic components.

Psychomotor: Demonstrate and Measure values of various electronics components

Affective: Attitude of (i) Identify (ii) Test/Measure (iii) Choose (iv) Operate

COURSE OUTCOMES:

EIG101-1 Identify and use various types of resistors in different applications.

EIG101-2 Identify and use various types of capacitors in different applications.

EIG101-3 Identify and use various types of inductors in different applications.

EIG101-4 Illustrate the use of cables and connectors in different applications.

EIG101-5 Illustrate the use of switches ,relays and displays in industrial applications.

EIG101-6 Illustrate the use of PCB,ICs and SMDs in electronic equipment.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency : Use electronic components in electronic equipment.	3	2	-	3	-	2	3	3	2
EIG101-1	2	1	-	2	-	-	3	1	1
EIG101-2	2	1	-	2	-	-	3	1	1
EIG101-3.	2	1	-	2	-	-	3	1	1
EIG101-4	2	1	-	2	-	-	3	1	1
EIG101-5.	2	1	-	1	-	-	1	1	1
EIG101-6	3	2	2	3	3	2	3	3	3

CONTENT:

A) PRACTICALS / EXERCISES:

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 12 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1)	Identification electronic equipments in electronics laboratory	1) Identify different electronic equipments. 2) Operate DMM, power supply, CRO, function generation. 3) Illustrate the use of breadboard	EIG101-1
2)	Test different types of fixed resistors.	1) Identify different types of fixed resistor 2) Find value ,tolerance and wattage of different types of resistor using colour code 3) Measure value of resistor on DMM	EIG101-1
3)	Test the performance of Potentiometer	1) Test variation of resistance in linear, logarithmic potentiometer. 2)Record the reading in observation table 3) Draw graph of potentiometer by rotation of shaft on x-axis and resistance on y-axis.	EIG101-1

4)	Test the performance of TDR	1) Test variation of resistance in TDR 2) Record the reading in observation table 3) Draw graph of TDR by temperature in Celsius on x-axis and resistance on y-axis.	EIG101-1
5)	Test the performance of LDR	1) Test variation of resistance of LDR 2) Record the reading in observation table 3) Draw graph of LDR by intensity of light in cm on x-axis and resistance on y-axis.	EIG101-1
6)	Test different types of fixed capacitors.	1) Identify different types of fixed capacitors 2) Find value of different types of capacitors using various method.	EIG101-2
7)	Test different types of Variable Capacitor	1) Identify different types of variable capacitors 2) Find value of different types of capacitors using LCR Q- meter.	EIG101-2
8)	Test different types of inductors.	1) Identify different types of inductors 2) Find value of different types of inductors using color code and LCR Q meter.	EIG101-3
9)	Identification of different types of cables	1)Identify different types of cables. 2)Demonstrate the use of cables.	EIG101-4
10)	Identification of different types of connectors.	1)Identify different types of connectors. 2)Demonstrate the use of connectors.	EIG101-4
11)	Test performance of Switches	1)Identify different types of switches, 2)Test the working of switches. 3)Measure contact resistance of switches using DMM.	EIG101-5
12)	Test performance of relay	1)Identify different types of Relays 2)Test the working of relay 3)Measure of contact resistance of relays.	EIG101-5
13)	Test performance of Displays	1)Identify different types of Displays. 2)Test the working of the displays. 3)Display numbers and letters using displays circuit.	EIG101-5
14)	Identification of SMDs and ICs	1) Identify SMDs and ICs. 2) Read and interpret data sheet of	EIG 101-6

		various IC and SMD components.	
15	Design PCB(Demonstration using software tool or Video)	1) Illustrate the process of preparing a sample circuit on single sided PCB 2)Test the PCB	EIG 101-6
16	Visit the industry	1)Visit to any Electronic component /PCB manufacturing industry 2)Write the visit report.	EIG 101-6

B) THEORY :

Section I

Chapter	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG101-1 Identify and use various types of resistors in different applications.			
01	Resistors: 1.1 Components-discrete, non-discrete, Active, passive components. 1.2 Concept of Resistors, Classification 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, operating temperature 1.4 Construction, application of Fixed Resistor - Carbon film resistors, Standard Wire wound resistors 1.5 Construction, working, application and characteristic curves of Non-Linear resistor-TDR, LDR 1.6 Concept of Variable resistor- linear & logarithmic potentiometer, and trimmer and rheostat 1.7 Comparison between Linear and Logarithmic Potentiometer 1.8 Color Coding with three, four and five bands and Equivalent circuit of resistors	12	14
EIG101-2 Identify and use various types of capacitors in different applications.			
02	Capacitors: 2.1 Concept of Capacitor, Classification of capacitors, dielectric Materials used for capacitors 2.2 Capacitors specification:-capacitor working	12	14

	<p>voltage, Insulation resistance, c/v ratio, power factor, Capacitive Reactance</p> <p>2.3 Construction, application of Fixed Capacitor -Disc Ceramic capacitor, Aluminum electrolytic capacitor, Tantalum electrolytic capacitor</p> <p>2.4 Construction, working, applications of Variable capacitor,-Air Gang, PVC gang capacitor, Trimmer capacitor</p> <p>2.5 Coding of capacitors using numerals and color band system and Equivalent circuit of capacitors</p>		
EIG101-3 Identify and use various types of inductors in different applications.			
03	<p>Inductors:</p> <p>3.1 Concept of Inductor, Classification of Inductor</p> <p>3.2 Specifications:-self inductance ,mutual inductance, coefficient of coupling, Q factor, Inductive Reactance</p> <p>3.3 Construction, application of Fixed Inductor- Air core, iron core and ferrite core</p> <p>3.4 Frequency range Inductors - (A.F.,R.F.,I.F.),filter choke and toroidal Inductor</p> <p>3.5 Construction, working, application of variable Inductor-Slug tuned Inductor, Tapped Inductor.</p> <p>3.6 Colors coding of Inductor and Equivalent circuit of Inductor.</p>	8	12
	Total	32	40

Section II

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
EIG101-4 Illustrate the use of cables and connectors in different applications.			
04	<p>Cables and Connectors</p> <p>Cables:</p> <p>4.1 Types of cable, specifications of cables-characteristic impedance, current carrying capacity, flexibility.</p> <p>4.2 Construction, and applications of coaxial cable, telephone cable, FRC cable, Twin core cable(Twisted & Shielded type)cable used for CRO, optical Fiber Cable.</p>	10	14

	Connectors: 4.3 Types of connectors, specifications of connectors- contact resistance, breakdown voltage, insulation resistance 4.4 Construction and applications of BNC, TNC, RF, D series, Audio, Video, printer, edge, FRC connectors, Phone Plug & Jacks		
EIG101-5 <i>Illustrate the use of switches ,relays and displays in industrial applications.</i>			
05	Switches, Relays and Displays Switches: 5.1 Types of Switches , Specifications - voltage rating, contact current rating, contact resistance, life- electrical life, mechanical life 5.2 Construction and application of Toggle, Rotary, push to on & push to off, Rocker switch, slide switch. Relays: 5.3 Define NO,NC and Common contact, Specifications of Relay-Operating time, Release time, contact resistance, life- electrical life, mechanical life 5.4 Construction, working and application of General purpose relay ,Dry reed ,Mercury wetted Reed relay Displays: 5.5 Classifications of displays 5.6 Construction, operation & application of LED, Seven segment display-common cathode & common anode display, Dot matrix display, sixteen, fourteen segment display 5.7 Construction, operation & applications of Liquid crystal display (LCD)-Dynamic Scattering Display 5.8 Difference between switch, relay and Displays.	14	16
EIG101-6 <i>Illustrate the use of PCB,ICs and SMDs in electronic equipment.</i>			
6	Introduction to PCB, SMD and IC PCB: 6.1 Concept of PCB ,Advantages & disadvantages of PCB, Types of PCB 6.2 Base & Conducting material, types of laminates, Flowchart for preparation of single sided PCB	08	10

	SMD: . 6.3 Introduction to SMT,SMD 6.4 Advantages & disadvantages of SMD. IC: 6.5 Concept of IC, Advantages & disadvantages of ICs 6.6 Classification of IC's, Linear and Digital IC's and its examples, Flowchart for preparation of IC		
	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./Section	Name of topic	Distribution of marks (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
I/1	Resistors	02	04	08	EIG101-1	14
I/2	Capacitors	02	04	08	EIG101-2	14
I/3	Inductors	02	04	06	EIG101-3	12
II/4	Cables and connectors	02	04	08	EIG101-4	14
II/5	Switches, relays and displays	04	04	08	EIG101-5	16
II/6	Introduction to PCB, SMD and IC	02	04	04	EIG101-6	10
	Total >>	14	24	42		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks as per given criteria in the laboratory manual

Domain	Particulars	Marks out of 25
Cognitive	Preparation for practical	05
Psychomotor	Operating skills	05
	Observation/Result	05
Affective	Discipline and punctuality	05
	Procedure/Safety	05

	Measures/Presentation	
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

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma II.*

b) Assessment Criteria for Term-end Practical Examination:

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 Table	10
4	Result / calculations / graphs	10
5	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.PPT 4. Item Bank 5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS 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
8.	S.K. Bhattacharya	Electrical & Electronics Engineering Materials Component	Khanna
9.	Debashis De	Basic Electronics	Pearson
10	Grover & Jamwal	Electronic Components and Materials	Dhanpat Rai & Sons
11	M.L. Gupta	Electrical Engineering Materials	Dhanpat Rai & Sons
12	R.S. Sedha	Text book of Applied Electronics	S. Chand

b) Websites

- 1) <http://www.electronica-india.com/>
- 2) <http://electronicsclub.info/>
- 3) <http://nptel.ac.in>
- 4) <http://www.electronics-tutorials.com/>
- 5) <http://www.efymag.com/>
- 6) <http://www.electronicsforu.com>
- 7) <http://www.kpsec.freeuk.com/symbol.htm>
- 8) http://en.wikipedia.org/wiki/Electronic_component

COURSE ID :

Course Name : ENGINEERING PHYSICS (EE/IE/ET/IT)
Course Code : CCG102
Course Abbreviation : GPHB

TEACHING AND EVALUATION SCHEME:

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

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme:

Component	Progressive Assessment			Semester end		Total
	Theory	Practical*		Theory	Practical*	
Duration	Average of two tests of 20 marks each	Practical assignment (CA)*	One Skill Test (2 hours) *	One paper (3 hours)	One practical (2 hours)*	
Marks	20	25	25	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 :

CCG102-1 Estimate errors in measurement of physical quantities.

CCG102-2 Select proper material in engineering industry by analysis of its physical properties

CCG102-3 Use basic principles of wave motion for related engineering applications

CCG102-4 Apply principles of optics, electricity to solve engineering problems

CCG102-5 Express importance of Lasers, X-rays and nanotechnology

CCG102-6 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	PO 1 Basic and discipline specific knowledge	PO 2 Problem analysis	PO 3 design/ development of solutions	PO 4 Engineering Tools, experimentation and testing	PO 5 Engineering practice for society, sustainability and environment	PO 6 Project management	PO 7 Life-long learning	PSO1	PSO2
<i>Competency: Apply principles of Physics to solve engineering problems.</i>	3	1	1	2	1	1	2		
CCG101-1.	3	1	1	2	-	1	2		
CCG101-2	3	1	1	2	1	1	2		
CCG101-3	3	1	1	2	1	1	2		
CCG101-4	3	1	2	2	2	1	2		
CCG101-5.	3	1	1	1	2	1	1		
CCG102-6	3	1	1	1	1	1	2		

CONTENT :

- A) LABORATORY WORK :** Laboratory work shall consist of the following :
 Minimum 10 required (* represents as experiments to be carried out compulsory and 02 experiments should be from the remaining list)

List of Laboratory experiments and related skills to be developed:
(Each experiment 02 hours)

Sr. No.	Title of Experiment	Skills to be developed	Course Outcome
1*	To measure internal and external dimensions of hollow cylinder by using Vernier Caliper	i) Going through safety measures required ii) Determine least count and zero error in the measuring instrument. iii) Measuring internal and external dimensions of given objects iv) Handling the measuring instruments for measuring depth, thickness etc. v) Tabulating observations and calculations	CCG102-1

		vi) Interpreting results	
2*	To measure the diameter of bob and thickness of plate by using Vernier Caliper	i) Going through safety measures required ii) Determine least count and zero error in the measuring instrument. iii) Measuring dimensions of given objects iv) Handling the measuring instruments for measuring depth, thickness etc. v) Tabulating observations and calculations vi) Interpreting results	CCG102-1
3*	To measure the diameter of bob and thickness of plate by using Micrometer screw gauge	i) Going through safety measures required ii) Determine least count and zero error in the measuring instrument. iii) Measuring dimensions of given objects iv) Handling the measuring instruments for measuring depth, thickness etc. v) Tabulating observations and calculations vi) Interpreting results	CCG102-1
4*	To determine the viscosity of liquid by Stokes method.	i) Going through safety measures required ii) Measuring diameter of steel ball using micrometer screw gauge. iii) Measuring terminal velocity of steel ball in the liquid column. iv) Use of stop watch for measurement of time. v) Tabulating observations and calculations vi) Interpreting results	CCG102-2
5	To determine the buoyancy force on a solid immersed in a liquid	i) Going through safety measures required ii) Measuring dimensions of given solid using vernier caliper or micrometer screw gauge. iii) Measuring the volume of liquid collected iv) Tabulating observations and calculations v) Interpreting results	CCG102-2
6*	To measure unknown resistance of wire by Ammeter – Voltmeter method.	i) Going through safety measures required ii) Drawing the circuit diagram of the required experiment. iii) Connecting the instruments as per circuit diagram. iv) Measuring the value of potential difference & current in the circuit. v) Tabulating observations and calculations vi) Interpreting results	CCG102-4
7*	To verify Snell's law using glass slab	i) Going through safety measures required ii) Drawing necessary ray diagram iii) Measuring angles of incidence and refraction iv) Tabulating observations and calculations v) Interpreting results	CCG102-4
8*	To determine refractive index of prism by pin method	i) Going through safety measures required ii) Removing parallax between images and pins iii) Measuring the angle of refraction correctly iv) Drawing path of refracted ray through prism v) Drawing i- δ graph vi) Tabulating observations and calculations vi) Interpreting results	CCG102-4

9	To study Total Internal Reflection using glass slab	i) Going through safety measures required ii) Drawing necessary ray diagram iii) Measuring angles of incidence and refraction iv) Tabulating observations and calculations v) Interpreting results	CCG102-4
10	To determine velocity of sound by resonance tube	i) Going through safety measures required ii) Adjusting the resonating length by discriminating resonating sound from sound produced by the tuning fork. iii) Measuring internal diameter of resonating tube using vernier caliper iii) Drawing inference & confirming Law $n\lambda = \text{constant}$ iv) Tabulating observations and calculations v) Interpreting results	CCG102-3
11	To determine the acceleration due to gravity by 'g' by simple pendulum	i) Going through safety measures required ii) Measuring length of pendulum iii) Finding least count of stopwatch iii) Measuring periodic time with the help of stop watch iv) Tabulating observations and calculations v) Interpreting results	CCG102-3
12*	To measure unknown resistance by Wheatstone's meter bridge.	i) Going through safety measures required ii) Drawing the circuit diagram for the experiment iii) Connecting the resistances as per circuit diagram. iii) Finding the correct position of null point & measuring correct balancing lengths on Meter bridge. iv) Tabulating observations and calculations v) Interpreting results	CCG102-4
13	To verify series law of resistances by Wheatstone's meter bridge.	i) Going through safety measures required ii) Drawing the circuit diagram for series connections of the resistances. iii) Connecting the resistances for series method as per circuit diagram. iii) Finding the correct position of null point & measuring correct balancing lengths on Meter bridge. iv) Tabulating observations and calculations v) Interpreting results	CCG102-4
14	To parallel law of resistances by Wheatstone's meter bridge.	i) Going through safety measures required ii) Drawing the circuit diagram for parallel connections of the resistances. iii) Connecting the resistances for parallel method as per circuit diagram. iii) Finding the correct position of null point & measuring correct balancing lengths on Meter bridge. iv) Tabulating observations and calculations v) Interpreting results	CCG102-4

15	To be added by the subject teacher as per requirement
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B) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG102-1 Estimate errors in measurement in Physical quantities			
1	UNITS AND MEASUREMENT 1.1 Unit, Physical Quantities : Fundamental and Derived Quantities and their units 1.2 Systems of units : CGS, MKS, FPS and SI 1.3 Errors , Types of errors : Instrumental, Systematic and Random error, Estimation of errors : Absolute, Relative and percentage errors 1.4 Significant figures 1.5 Simple Numerical problems	06	10
Course Outcome CCG102-2 Select proper material in engineering industry by analysis of its physical properties			
2	ELASTICITY 2.1 Definitions of elasticity, plasticity, rigidity, deforming force, restoring force 2.2 Stress, Strain and their types 2.3 Elastic Limit, Statement of Hooke's law, modulus of elasticity and its types 2.4 Relation between Y, K and η (No derivation) 2.5 Ultimate stress, breaking stress, Working stress, Factor of safety 2.6 Applications of elasticity 2.7 Simple Numerical problems	06	10
3	VISCOSITY 3.1 Definition and meaning of viscosity, velocity gradient 3.2 Newton's law of viscosity, Coefficient of viscosity 3.3 Stokes law 3.4 Derivation of expression for coefficient of viscosity of liquid by Stokes method 3.5 Applications of viscosity. No numericals on above topic	06	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG102-3 Use basic principles of wave motion for related engineering applications			
4	WAVE MOTION 4.1 Definitions of periodic motion, Linear S. H. M. 4.2 Parameters of linear SHM : Amplitudes, Period, Frequency and Phase 4.3 Characteristics of linear SHM 4.4 Concept and definition of wave 4.5 Parameters of wave- Frequency, periodic time, phase and wavelength 4.6 Types of waves (transverse and longitudinal) and their characteristics 4.7 Free and forced oscillations 4.8 Phenomenon of resonance and its applications No numericals on above topic	06	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.			

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG102-4 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 (in terms of angles of deviation only) 5.6 Simple Numerical problems	06	08
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 Simple Numerical problems	06	10
Course Outcome CCG102-5 Express the importance of Lasers, X-rays and nanotechnology.			
7	MODERN PHYSICS 7.1 LASER 7.1.1 Introduction of LASER 7.1.2 Properties of laser	08 (03)	14 (06)

	7.1.3 Spontaneous and stimulated emission 7.1.4 Population inversion and optical pumping 7.1.5 Applications of LASER No numericals on above topic 7.2 X-RAYS 7.2.1 Nature and properties of x-rays. 7.2.2 Production of x-rays by Coolidge tube 7.2.3 Applications of x-rays No numericals on above topic 7.3 INTRODUCTION TO NANOTECHNOLOGY 7.3.1 Definition of nanoscale, nanometer, nanoparticle 7.3.2 Definition and examples of nanostructured materials 7.3.3 Applications of nanotechnology in electronics, automobile, textile, space, medicine, cosmetics and environment No numericals on above topic	(03)	(04)
		(02)	(04)
Course Outcome CCG102-6 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	04	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	Units and Measurement	2	4	4	CCF102-1	10
I/2	Elasticity	2	2	6	CCF102-2	10
I/3	Viscosity	2	2	4	CCF102-2	08
I/4	Wave motion	4	8	-	CCF102-3	12
II/5	Properties of light	2	2	4	CCF102-4	08
II/6	Electricity	2	2	6	CCF102-4	10
II/7	Modern Physics	4	4	6	CCF102-5	14
II/8	Fiber Optics	2	4	2	CCF102-6	08
	Total	20	28	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.

ASSESSMENT CRITERIA FOR PRACTICAL WORK AND PRACTICAL EXAMINATION

c) Assessment Criteria for Practical 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 Practical Work	05
	Total	25

d) Criteria for assessment at semester end practical exam :

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

Sr. no	Criteria	Marks allotted
1	Preparedness for practical	10

2	Correct figures / diagrams	10
3	Observation tables	10
4	Result table / calculations / graphs	10
5	Safety / use of proper tools	10
	Total	50

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

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

Teaching and Learning resources:

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

REFERENCE MATERIAL :

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Narlikar	Text book of Physics for class XI & XII (Part-I, Part-II)	N.C.E.R.T Delhi
2.	P.V.Naik.	Engineering Physics	Pearson Edu. Pvt. Ltd, New Delhi.
3	Narkhede, Pawar, Sutar	Concepts in Physics, Vol. I & II.	Bharti Bhawan Ltd, New Delhi.
4	Walker, Halliday, Resnick	Principles of Physics.	Wiley Publication. , New Delhi.
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/>
- iv) <http://nptel.ac.in/course.php?disciplineId=115>
- v) <http://nptel.ac.in/course.php?disciplineId=104>
- vi) www.fearofphysics.com
- vii) www.science.howstuffworks.com

COURSE ID:

Course Name : **BASIC ELECTRONICS**
Course Code : **EIG 103**
Course Abbreviation : **GBTX**

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 *	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (ii) One PST of 25 marks	One paper (3 hour)	Term End Practical Exam (03 hours)	
Marks	20	--	80	50 E	150

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

RATIONALE:

Knowledge of Electronic components & devices is quite essential for a student of electronic engineering diploma programme while maintaining electronics equipments. Although industrial electronics and electronics and telecommunication is specialized field of electronics engineering, a study of operating principles and concepts are essential which will help in troubleshooting electronics equipment. This course is designed in such a way that, the students will able to apply knowledge to solve broad electronics engineering application.

COMPETENCY :

Maintain electronic circuits comprising of discrete electronics components

Cognitive : Identify and illustrate the operation of basic electronics devices.

Psychomotor : Maintain and operate simple basic electronics circuit.

Affective : Attitude of i) Identify ii) Draw iii) Operate v)Test

COURSE OUTCOMES :

EIG103-1 : Identify and handle semiconductor diodes.

EIG103-2 : Examine and operate rectifier and filter.

EIG103-3: Identify and use various types bipolar junction transistor and its configuration

EIG103-4: Examine and use various of types of biasing circuits and amplifiers

EIG103-5 : Identify and use types of FET

EIG103-6 : Illustrate the use of different regulated power supplies

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency : Maintain electronic circuits comprising of discrete electronics components	3	-	-	2	2	1	3	3	2
EIG103-1	2	-	-	-	-	-	2	2	2
EIG103-2	3	-	-	2	2	2	3	3	2
EIG103-3	3	-	-	2	-	1	2	2	2
EIG103-4	3	-	-	2	2	-	3	1	1
EIG103-5	3	-	-	1	-	-	2	1	1
EIG103-6	3	-	-	2	2	1	3	2	2

CONTENT:

A. Suggested Practical's/ Exercise

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 experiments). Experiments numbered from 13 onwards can be performed or demonstrated by using simulation software.

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Test the performance of PN junction diode	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw the forward & reverse characteristics	EIG 103-1
2	Test the performance of zener diode	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw the forward & reverse characteristics	EIG 103-1
3	Test Zener voltage regulator for given voltage	1) Build the circuit as per circuit diagram 2) Record the readings in observation	EIG 103-6

		table	
4	Test the half wave circuits on breadboard	1) Construct the circuit as per circuit diagram 2) Record the waveform displayed on the oscilloscope according to the setting of VOLT/DIV 3) Record readings measured in observation table	EIG 103-2
5	Test the full wave center-tapped circuit on breadboard	1) Construct the circuit as per circuit diagram 2) Record the waveform displayed on the oscilloscope according to the setting of VOLT/DIV 3) Record readings measured in observation table	EIG 103-2
6	Test the full wave bridge circuit on breadboard	1) Construct the circuit as per circuit diagram 2) Record the waveform displayed on the oscilloscope according to the setting of VOLT/DIV 3) Record readings measured in observation table	EIG 103-2
7	Test C filter circuit for getting minimum ripples with any type one of rectifier	1) Construct the circuit as per circuit diagram 2) Record the waveform displayed on the oscilloscope according to the setting of VOLT/DIV 3) Record readings measured in observation table and calculate ripple factor.	EIG 103-2
8	Test LC filter circuit for getting minimum ripples with any type one of rectifier	1) Construct the circuit as per circuit diagram 2) Record the waveform displayed on the oscilloscope according to the setting of VOLT/DIV 3) Record readings measured in observation table and calculate ripple factor	EIG 103-2
9	Test the full wave bridge circuit on breadboard with π -filter	1) Construct the circuit as per circuit diagram 2) Record the waveform displayed on the oscilloscope according to the setting of VOLT/DIV 3) Record readings measured in observation table and calculate ripple factor	EIG 103-2

10	Test the Input and Output characteristics of BJT in common base configuration.	1) Construct the circuit as per circuit diagram 2) Record the reading in observation table. 3) Sketch the graph of input & output characteristics	EIG 103-3
11	Test the Input and Output characteristics of BJT in common emitter configuration.	1) Construct the circuit as per circuit diagram 2) Record the reading in observation table. 3) Sketch the graph of input & output characteristics	EIG 103-3
12	Find the specification of given transistor using datasheet.	1) Identify various specifications given in datasheet 2) Note the values in observation table	EIG 103-3
13	Test the assembled voltage divider circuit for given input	1) Construct the circuit as per circuit diagram 2) Record the reading in observation table.	EIG 103-4
14	Test the working of the BJT as an amplifier in CE mode	1) Construct the circuit as per circuit diagram 2) Record the reading in observation table. 3) Sketch the graph of input & output waveforms.	EIG 103-4
15	Test the performance of FET drain characteristics	1) Build the circuit as per circuit diagram 2) Record the reading in observation table. 3) Sketch the graph drain characteristics	EIG103-5
16	Test the performance of FET transfer characteristics	1) Build the circuit as per circuit diagram 2) Record the reading in observation table. 3) Sketch the graph transfer characteristics	EIG103-5
17	Test the performance of Regulator IC's: IC's 78XX, 79XX.	1) Build the circuit as per circuit diagram 2) Record the reading in observation table	EIG103-6
18	Build/Test the performance of assembled circuit for low or high voltage regulator using IC723.	1) Build the circuit as per circuit diagram 2) Record the reading in observation table	EIG103-6
19	Test various blocks of DC regulated power supply.	1) Build circuit as per circuit diagram or Identify the blocks in assembled DC power supply 2) Test the output at various points.	EIG103-6

B. THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>EIG103-1 Identify and handle semiconductor diodes.</i>		

1	Semiconductor Diode 1.0 Conductor , Insulator, semiconductor 1.0.1 Band theory 1.0.2 Intrinsic semiconductor : Si , Ge 1.0.3 Doping 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 Breakdown in diodes-Avalanche, zener 1.2.3 Characteristics 1.2.4 Specifications. 1.2.5 Applications	10	14
<i>EIG103-2 Examine and operate rectifier and filter.</i>			
2.	Rectifiers and Filters 2.0 Rectifiers: 2.0.1 Definition: Rectification, rectifier 2.0.2 Need of rectification 2.0.3 Classification of rectifier 2.1 Half wave rectifier and full wave rectifier (Center-tapped and bridge) 2.1.1 Circuit diagram and waveforms 2.1.2 Operation 2.1.3 Parameters its definition and values for corresponding rectifier- (i) Average output voltage and current (ii) Ripple factor (iii) Rectifier efficiency (iv) Peak Inverse Voltage (v) Transformer Utilization Factor 2.1.4 Comparison of rectifier 2.2 Filter – 2.2.1 Need of filter 2.2.2 Types of filter- (i) Shunt capacitor filter (ii) Series inductor filter (iii) LC filter (iv) CLC filter 2.2.2 Operation of each filter w.r.t. full wave bridge Rectifier only 2.2.3 Comparison of filters	10	12

<i>EIG103-3 Identify and use various types bipolar junction transistor and its configuration</i>			
3	Bipolar Junction Transistor(BJT) 3.0 BJT-.Types, symbols 3.1 Construction of BJT. 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 : alpha,beta, Collector-base voltage (V_{CB}) , Collector-emitter voltage (V_{CEO}),Maximum collector dissipation (P_C) ,Collector current(I_C) ,Collector saturation voltage($V_{ce(sat)}$) 3.6 Relation between α & β 3.7 Switching action of transistor 3.8 Applications of transistor 3.9 Numericals based on relation of I_C , I_e & I_b	12	14
	Sub-total	32	40

Section-II

Sr. No.	Topics	Teaching hours	Marks
<i>EIG103-4 Examine and use various of types of biasing circuits and amplifiers</i>			
4.	Biasing of transistor and amplifiers 4.1 Load line- DC Load Line 4.2 Q Point 4.3. Bias Stability, stability factor, Factors affecting bias stability, Thermal runaway 4.3 Transistor Biasing Methods-List and Circuit ,Equations, advantages & disadvantages Of 4.3.1 Fixed Bias Circuit 4.3.2 Voltage Divider Bias Circuit 4.4 Types of amplifiers: Single stage and multistage Amplifiers 4.5 Single stage CE amplifier. 4.5.1 Circuit Diagram 4.5.2 Working (Function of each component) 4.5.3 Input Output Waveform 4.5.4 Frequency response and bandwidth 4.5.5 Applications 4.6. Types of coupling in multistage amplifiers 4.7. Two-stage RC Coupled CE amplifier 4.7.1 Circuit Diagram 4.7.2 Working(Function of each component) 4.7.3 Applications	12	14

<i>EIG103-5 Identify and use types of FET</i>			
5	Field Effect Transistor (FET) 5.0 FET as voltage controlled device, Classification of FET 5.1 Junction Field Effect Transistor(JFET) 5.1.1 Symbols of N-channel and P-channel JFET 5.1.2 Construction of N-channel and P-channel JFET 5.1.3 Working principle of N-channel JFET 5.1.4 Drain and transfer Characteristics of N- channel JFET 5.1.5 JFET parameters-A.C. drain resistance(r_d), transconductance (g_m), amplification factor(μ) 5.1.6 Relation between μ , r_d & g_m 5.1.7 Advantages, disadvantages, applications of JFET 5.2 Comparison between JFET and BJT 5.3 Metal Oxide Field Effect Transistor:- 5.3.1 Types of MOSFET- Depletion type MOSFET and Enhancement type MOSFET 5.3.2 Symbol of Depletion type MOSFET and Enhancement type MOSFET, 5.3.3 Working principle of N-channel depletion and enhancement type MOSFET 5.3.4 Applications of MOSFET	12	14
<i>EIG103-6 Illustrate the use of different regulated power supplies</i>			
6.	Regulated Power Supply 6.1 Block diagram of Regulated power supply. 6.2 Load and Line Regulation 6.2 Zener diode as a voltage regulator-Circuit diagram and working 6.4 Types of IC voltage regulator-Fixed and Variable voltage regulator 6.4.1 IC 78xx & IC 79xx series of voltage regulators 6.3.1 Features 6.3.2 Pin diagram 6.3.3 Applications 6.3.4 Practical example with IC such as 7805,12 6.4. 2 IC 723 voltage regulator. 6.6.1 Features 6.6.2 Pin diagram 6.6.3 Applications 6.6.4 Practical example of IC723 as a low and high voltage regulator	08	12
	Sub-total	32	40
	Total	64	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 (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
1	Semiconductor Diode	02	04	08	EIG103-1	14
2	Rectifiers and Filters	02	04	06	EIG103-2	12
3	Bipolar Junction Transistor	02	06	06	EIG103-3	14
4	Biasing of transistor and amplifiers	02	06	06	EIG103-4	14
5	Field Effect Transistor (FET)	02	06	06	EIG103-5	14
6	Regulated Power Supply	02	04	06	EIG103-6	12
	Total >>	12	28	38		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

e) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Preparation for practical	05
Psychomotor	Operating skills	05
	Observation/Result	05
Affective	Discipline and punctuality	05
	Procedure/Safety	05
	Measures/Presentation	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*.

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

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma I.*

f) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral Based on Test	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
(Online/Offline)

Teaching and Learning Resources:

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

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	V. K. Mehta	Principles of Electronics	S.Chand
2.	B. L. Theraja	Basic Electronics	S.Chand
3.	R.S.Sedha	A text book of Applied Electronics	S.Chand
4.	G. K. Mithal	Applied Electronics	Khanna Publication
5.	A. Motershed	Electronics Devices & Circuits	PHI Publication
6.	Malvino	Electronics Principles	McGraw Hill
7.	Bell, Devid	Fundamental of Electronics Devices and circuits	Oxford University

b) Websites

- 1) www.nptel.iitm.ac.in
- 2) www.datasheetcafe.com
- 3) www.learningaboutelectronics.com
- 4) www.futurlec.com
- 5) www.bis.org.in
- 6) www.electrical4u.com
- 7) www.cadsoft.io
- 8) www.electronics-tutorials.com

* * *

COURSE ID:

Course Name : ENGINEERING CHEMISTRY (EE/IE/IT/ET)
Course Code : CCG104
Course Abbreviation : GCHB

TEACHING AND EVALUATION SCHEME:

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

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme:

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

* Assessment as per pro-forma II. .

I – Internal Examination

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:

- Sketching and labeling the diagrams for extraction of copper
- Experimentally analyzing the water samples for preparing portable water by different methods.
- Preparing chart of showing percentage, composition, properties and industrial applications of solders.
- Handling & use of glassware & chemicals.

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

COURSE OUTCOMES

- CCG104-1** Understand the application of basic concepts in chemistry.
- CCG104-2** Apply the knowledge of electrochemistry in industry for electroplating and electro-refining.

3. **CCG104-3** Interpret the reasons of corrosion & remedies by using appropriate techniques.
4. **CCG104-4** Select the relevant catalyst for given application.
5. **CCG104-5** Select insulators, adhesive, composite materials, Plastic & rubber for different applications in the field of engineering
6. **CCG104-6** Use relevant water treatment process to solve industry problems.
7. **CCG104-7** Select proper type of cell based on the requirement in electrical/ electronic and computer engineering.
8. **CCG104-8** Understand the method of extraction of copper.
9. **CCG104-9** Select proper type of alloyes, solders for various purposes.

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 & Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design/development of solutions	PO 4 Engineering Tools, Experimentation & Testing	PO 5 Engineering practice for society sustainability & environment	PO 6 Project management	PO 7 Life-long learning	PSO1	PSO2
Competency: Apply principles of advanced chemistry to solve engineering problems	3	3	3	3	2	2	2	2	2
CCG104-1	3	3	3	2	-	-	1	2	2
CCG104-2	3	3	2	3	1	1	2	2	2
CCG104-3	3	3	3	2	2	1	1	3	3
CCG104-4.	3	2	2	1	1	1	2	1	1
CCG104-5	3	2	2	1	2	1	1	2	2
CCG104-6	3	3	3	2	2	1	1	2	3
CCG104-7	3	3	2	2	3	1	1	2	2
CCG104-8	3	3	3	2	3	1	1	3	3
CCG104-9	3	3	2	2	1	-	-	2	2

CONTENT:

A. LABORATORY WORK

Lab 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	CCG103-1
2	Volumetric analysis of solution.	Molecular weight, equivalent weight, acidity, basicity normality of solution. Awareness of different types of titrations, use of indicators	CCG103-1
3	Preparation of 1 N, 0.5 N & 0.1 N Solutions of different chemicals like NaOH, HCl, Oxalic acid, FeSO ₄ , etc.	Skill of weighing, handling Glassware & measuring solutions	CCG103-1
4	Titration of strong acid and strong bases (HCl X NaOH)	Skills of determining accurate end point of titration & development of measurement skills.	CCG103-1
5	Titration of strong acid, strong base & weak acid (HCl X NaOH X H ₂ C ₂ O ₄ .H ₂ O)	Skills of determining accurate end point of titration & development of measurement skills.	CCG103-1
6	Titration of weak base , strong acid & strong base (Na ₂ CO ₃ X H ₂ SO ₄ X KOH)	Skills of determining accurate end point of titration & development of measurement skills.	CCG103-1
7	Estimation of chloride content in water by Mohr's method	Measurement skill utilization of practical data for testing & estimation	CCG103-5
8	Determination of amount of 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	CCG103-5
9	Estimation of viscosity of oils by Ostwald's method	Measurement skill utilization of practical data for testing & estimation	CCG103-1
10	Estimation of Ca in limestone.	Measurement skill utilization of practical data for testing & estimation	CCG103-5
11	Titration of KMnO ₄ & FeSO ₄ (Redox titration)	Skills of determining accurate end point of titration & development of measurement skills.	CCG103-6
12	Estimation of % of Fe in given sample of steel	Measurement skill utilization of practical data for testing & estimation	CCG103-6
13	Determination of alkalinity of water	Measurement skill utilization of practical data for testing & estimation	CCG103-6

B) THEORY:

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCG103-1 Understand the application of basic concepts in chemistry.			
1	ATOMIC STRUCTURE AND CHEMICAL BONDING 1.1 Atom :Fundamental particles, Nature of atom 1.2 Atomic Number, Mass Number, Isotopes and isobars 1.3 Bohr's theory of atom 1.4 Statement of Hund's rule of maximum multiplicity,Pauli's exclusion principle Aufbau's principle 1.5 Lewis and Langmuir's concept of stable electronic configuration 1.6 Electovalency and Co-valency 1.7 Formation Of electrovalent compounds- NaCl, CaCl ₂ . 1.8 Formation of Covalent compounds-H ₂ O, CO ₂	05	08
CCG103-2 Apply the knowledge of electrochemistry in industry for electroplating and electro-refining.			
2	ELECTROCHEMISTRY 2.1 Definitions- Conductor, Electrolyte, Electrode, Ionisation, Eletrolysis. 2.2 Arrhenius Theory Of Ionisation 2.3 Degree of Ionisation & Factors affecting degree of ionisation. 2.4 Electrolysis of molten NaCl. 2.5 Electrolysis of CuSO ₄ solution by using Cu-electrodes 2.6 Industrial applications of electrolysis 2.6.1 Electroplating 2.6.2 Electro refining of Cu	05	08
CCG103-3 Interpret the reasons of corrosion & remedies by using appropriate techniques.			

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
3.	CORROSION AND PROTECTIVE COATING 3.1 Definition & types of corrosion 3.2 Dry or Atmospheric corrosion , Oxide Film Formation & its types ,Factors affecting atmospheric corrosion 3.3 Wet or electrochemical corrosion 3.4 Factors influencing immersed corrosion 3.5 Methods of protection of metal from corrosion - Hot dipping (Galvanizing & Tinning) ,Metal spraying, Metal cladding, Cementation or sherardizing	04	06
CCG103-4 Select the relevant catalyst for given application.			
4	CATALYSIS 4.1 Defination. 4.2 Typesof Catalysts with example. - Homogenous catalyst. - Heterogenous catalyst 4.3 Promoters. 4.4 Negative catalysis. 4.5 Autocatalysis.	02	04
CCG103-5 Select insulators, adhesive, composite materials, Plastic & rubber for different applications in the field of engineering			
5	CHEMISTRY OF NONMETALLIC ENGINEERING MATERIALS 5.1 INSULATORS <i>5.1.1 Definition & Characteristics of insulator</i> 5.1.2 Preparation, properties & uses of glass wool, Thermocole. 5.2 COMPOSITE MATERIALS 5.2.1 Definition, 5.2.2 Classification, Properties & Application of composite materials 5.3 PLASTICS 5.3.1 Definition of Polymer, Polymerization. 5.3.2 Types of polymerization – Addition & Condensation polymerization. 5.3.3 Classification of plastic - Thermosoftening & thermosetting plastic. 5.3.4 Engineering properties & applications of plastic. 5.4 RUBBER 5.4.1 Elastomer	08	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.4.2 Drawbacks of Natural rubber. 5.4.3 Vulcanization of rubber. 5.4.4 Engineering properties & uses of rubber. 5.5 ADHESIVES 5.5.1 Definition of adhesives. 5.5.2 Characteristics of good adhesive. 5.5.3 Properties of adhesive.		
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)
CCG103-6 Use relevant water treatment process to solve industry problems.			
6	WATER 6.1 Impurities in natural water 6.2 Hard water & Soft water 6.3 Hardness of water- Temporary & Permanent 6.4 Reactions of hard water with soap 6.5 Disadvantages of hard water for domestic & Industrial purpose - Textile Industry, Sugar Industry, Paper Industry Dying Industry. 6.6 Sterilization of water - Chlorination –by Cl ₂ , bleaching powder, chloraamine with chemical reactions 6.7 Ion Exchange method to remove total hardness of Water.	08	12
CCG104-7 Select proper type of cell based on the requirement in electrical/ electronic and computer engineering.			

7	CELL AND BATTERIES 7.1 Definition of Electrochemical cell, Battery, Charge, Discharge, Closed Circuit Voltage, Electrochemical couple, Internal resistance, Open Circuit Voltage, Separator, E.M.F. 7.2 Classification of Batteries such as – Primary & Secondary Batteries 7.3 Construction, Working and Applications of a Primary Cell such as Dry Cell , Secondary Cell such as Lead Acid Storage Cell 7.4 Charging and Discharging of Lead Acid Storage Cell 7.5 Hydrogen-Oxygen fuel cell, its chemical reactions & advantages 7.6 Introduction of solar cell	05	10
CCG104-8 Understand the method of extraction of copper.			
8	METALLIC CONDUCTORS 8.1 Occurrence of metals 8.2 Distinction between mineral & ore 8.3 Definition of flux, Gangue & Slag 8.4 Steps involved in metallurgy-Flow chart Concentration of ores— Physical Methods 1. Gravity Separation Method 2. Electromagnetic separation 3. Froth floatation method Chemical Methods 1. Calcination 2. Roasting . 8.6 Important ores of copper Metallurgy of copper-Extraction of copper from copper pyrites by concentration , roasting, smelting , Bessemerisation ,Electrorefining 8.7 Physical properties & uses of Copper.	08	14
CCG104-9 Select proper type of alloys, solders for various purposes.			
9	SOLDERS 9.1 Definition of alloy , classification of alloys & purposes of making alloy 9.2 Composition, properties & applications of 9.2.1 Soft solder. 9.2.2 Tinmann’s solder, 9.2.3 Brazing alloy , 9.2.4 Plumber’s solder 9.2.5 Rose metal 9.2.6 Woods metal .	03	04

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.

ASSESSMENT CRITERIA FOR LAB WORK AND PRACTICAL EXAMINATION

a) Assessment Criteria for Lab work :

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	-	CCG104-1	08
I/ 2	Electrochemistry	02	02	04	CCG104-2	08
I/ 3	Corrosion & protective coating	02	02	02	CCG104-3	06
I/4	Catalysis	02	02	-	CCG104-4	04
I/5	Chemistry of nonmetallic engg. materials	04	06	04	CCG104-5	14
II/6	Water	04	04	04	CCG104-6	12
II/7	Cell & Batteries	04	04	02	CCG104-7	10
II/8	Metallic conductors	06	06	02	CCG104-8	14
II/9	Solders	02	02	-	CCG104-9	04
	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.

Criteria for Continuous Assessment of Practical work

b) 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 50
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	10
	Writing skills	10
Affective	Discipline and punctuality	10
	Timeliness and accuracy	10
TOTAL		50

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	Understanding	05
	Application	05
Psychomotor	Operating Skills	05
	Writing skills	05
Affective	Discipline and punctuality	05
	Timeliness and accuracy	05
TOTAL		25

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

c) Criteria for assessment at semester end practical exam:

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

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

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	05
	Timeliness and accuracy	05
TOTAL		25

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Demonstrations
2. Classroom practices
3. Home Assignments
4. Discussion.

Teaching and Learning resources :

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

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	Engineering 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	-
9.	R.Gopalan, D.Venkappa	Engineering Chemistry	Vikas Publishing House.

b) Websites

- i) www.substech.com
- ii) www.kentchemistry.com
- iii) www.chemcollective.org
- iv) www.wqa.org
- v) www.chemistryteaching.com

COURSE ID :

Course Name : BASIC MATHEMATICS (CE/ME/EE/MT/IE/ET/IT)
Course Code : CCG105
Course Abbreviation : GBMT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : < nil >

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Tutorial	01	

Evaluation Scheme :

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

RATIONALE:

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

Competency:

Apply principles of Basic Mathematics to solve mathematical problems 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) :

- CCG105-1** : To solve given problems based on laws of logarithm.
CCG105-2 : To solve simultaneous equations using Cramer's rule & find area of triangle.
CCG105-3 : To resolve a given function into partial fractions.
CCG105-4 : To learn algebra of matrices & hence find Adjoint & Inverse of a given matrix.
CCF105-5 : To 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	PO 1 Basic & Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design / development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life – long learning	PSO1 Plan & Design	PSO2 Construction & Maintenance
Competency: Apply principles of Basic Mathematics to solve mathematical problems	3	2	1	3	-	-	3		
CCG105-1:	3	2	1	2	-	-	3		
CCG105-2 :	3	2	1	2	-	-	3		
CCG105-3.	3	2	2	2	-	-	3		
CCG105-4 :	3	2	2	2	-	-	3		
CCG105-5 :	3	2	2	3	-	1	3		

CONTENT:

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

Sr.No	Topics	Tutorial Content (10 problems in each tutorial)
1	Logarithm	Solve simple problems of Logarithms based on definition and laws
2	Determinants	Solve problems on determinant to find area of triangle, and solution of simultaneous equations by Cramer's rule
3	Partial Fractions	To resolve given function into partial fraction using appropriate method.
4	Matrices	Examples on addition ,Subtraction and Multiplication of Matrix
5	Matrices	To find Adjoint ,Inverse of a given matrix.
6	Trigonometric Ratios and Identities	Examples on conversion of degree to radian and vice versa,simple examples on trigonometry.

7	Allied Angles	Solve examples on Allied angles
8	Compound Angles	Solve examples on Compound angles
9	Factorization & De-factorization angles	Solve examples on Factorization & De-factorization formulae
10	Inverse Trigonometric Ratios	Solve examples on principle value and Inverse trigonometric functions

B) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG105-1 : To solve given problems based on laws of logarithm.			
1	Logarithm 1.1 Concept & laws of logarithm 1.2 Simple examples based on laws of logarithm	4	6
Course Outcome CCG105-2 : To solve simultaneous equations using Cramer's rule			
2	Determinants 2.1 Definition of nth order determinant 2.2 Expansion of second and third order determinants 2.3 To solve simultaneous equations having 3 unknowns using Cramer's Rule 2.4 Consistency of equations using Determinants 2.5 Area of Triangle by determinant method	04	06
Course Outcome CCG105-3 : To resolve a given function into partial fractions			
3	Partial Fractions 3.1 Definition of rational, proper and improper fractions 3.2 Various cases of Partial fractions and Examples	06	12
Course Outcome CCG105-4 : To learn algebra of matrices & hence find Adjoint & Inverse of a given matrix			
4	Matrices 4.1 Definition of a matrix, Types of matrices 4.2 Algebra of matrices 4.3 Equality of two matrices, Transpose of a matrix 4.4 Minor and Co-factor of an element of a matrix 4.5 Adjoint and Inverse of a matrix	10	16
	Total	24	40

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG105-1 : To solve given problems based on laws of logarithm.			
1	Logarithm 1.1 Concept & laws of logarithm 1.2 Simple examples based on laws of logarithm	4	6
Course Outcome CCG105-2 : To solve simultaneous equations using Cramer's rule			
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)
Course Outcome CCG105-5 : 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 2 θ , 3 θ 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)			Total Marks
		Knowledge	Comprehension	Application	
1	Logarithm	2	-	4	06
2	Determinants	-	2	4	06
3	Partial Fractions	2	2	8	12
4	Matrices	2	2	12	16
5	Trigonometric Ratios and Identities	2	-	2	04
6	Allied Angles	2	2	4	08
7	Compound Angles	2	-	8	10
8	Factorization & De-factorization angles	2	-	6	08
9	Inverse Trigonometric ratios	2	2	6	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.

INSTRUCTIONAL STRATEGIES :

Instructional Methods:

1. Lectures cum Demonstrations
2. Tutorials

Teaching and Learning resources:

1. Chalk board
2. Item Bank
3. MSBTE videos

REFERENCE MATERIAL :

a) Books:

Sr. No.	Author	Title	Publisher
1.	Sameer Shaha	Basic Mathematics	Tech Max Publication
2.	Patel, Rawal and others	Basic Mathematics	Nirali Prakashan, Pune
3.	G.V. Kumbhojkar	A Text Book on Engineering	Phadake Prakashan, Kolhapur

		Mathematics (First Year Diploma)	
4.	S. S. Shastry	Engineering Mathematics	Prentice Hall of India
5.	H.K.Das	Higher Engineering Mathematics	S.Chand Publication, New Dhelhi
6.	B.S. Grewal	Higher Engineering Mathematics	Khanna Publication, New Dhelhi
7.	P.M.Patil and Others	Basic Mathematics	Vision Prakashan, Pune

b) Website

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

* * *

Course ID :

Course Name : Basic Electrical Engineering (IE/ET)

Course Code : EIG107

Course Abbreviation : GBEE

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	Practical Examination (Internal)	
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 Proforma- II	
Marks	20	-	80	50I	150

Rationale:

The subject deals in understanding the basics of laws, working principle, construction, operation and applications of the various equipment, instruments and machines in electrical engineering.

COMPETENCY:

Apply the basic principles of electrical engineering to solve 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 of electrical engineering.

Affective:

- i) Attitude
- ii) Safety
- iii) curiosity, interest and self-confidence
- iv) working in team

Course Outcomes:

EIG107-1. Apply basic laws and principles of electrical engineering to electrical applications.

EIG107-2. Use principles of magnetic circuits to calculate various parameters in magnetic circuits.

EIG107-3. Understand basic principles of electromagnetic induction.

EIG107-4. Apply basic principles of AC circuits in electrical devices.

EIG107-5. Understand circuit parameters in AC circuits.

EIG107-6. Apply basic laws of electromagnetic induction principles in electric machines.

Competency, course outcomes and programme outcomes/programme specific outcomes (cp-co-po/ps) matrix.

[Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), “0”

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Disciplin e specific knowled ge	PO 2 Probl em Analy sis	PO 3 Design / Develo pment of solutio ns	PO 4 Engineer ing Tools, Experim entation and Testing	PO 5 Enginee ring Practice s for society, sustaina bility and Environ ment	PO 6 Project Manag ement	PO 7 Life- long Learnin g	PSO 1	PSO 2
Competency: Apply the basic principles of electrical engineering to solve engineering problems.	3	3	2	2	2	0	1	1	2
EIG107-1	3	2	2	2	2	0	2	2	1
EIG107-2.	3	3	2	2	1	0	1	2	1
EIG107-3	3	2	2	2	1	0	1	1	1
EIG107-4	3	2	2	2	2	0	1	2	1
EIG107-5	3	2	2	2	2	0	1	2	1
EIG107-6	3	1	2	2	2	0	1	2	1

CONTENT:

A. Practical exercises

The following practical exercises shall be conducted in the *Laboratory for developed* by the Institute in practical sessions of batches of about 20- 22 students:

Sr. no	Title of Practical	Skills/Competencies to be developed	Course outcome
1	Calculate the resistance of DC circuit by measuring voltage and current and verify using multi-meter. (Verify Ohm's law)	1. Build the circuit as per circuit diagram. 2. Record currents and voltages. 3. Calculate resistance and verify Ohm's law.	EIG107-1
2	Measure the voltages across resistances in the circuit and verify the readings using Kirchhoff's Voltage Law.	1. Build the circuit as per circuit diagram. 2. Record currents and voltages. 3. Verify Kirchhoff's voltage law.	EIG107-1

Sr. no	Title of Practical	Skills/Competencies to be developed	Course outcome
3	Measure the currents across resistances in the circuit and verify the readings using Kirchhoff's Current Law.	1. Build the circuit as per circuit diagram. 2. Record currents and voltages. 3. Verify Kirchhoff's current law.	EIG107-1
4	Determine the permeability of magnetic material by plotting its B-H curve.	1. Build the circuit transformer or motor as per circuit diagram. 2. Record currents and voltages. 3. Draw graph of voltage Vs current.	EIG107-2
5	Observe and identify the direction of induced emf in the coil for the relative motion between magnet and coil. (Verify Faraday's law of electromagnetic induction and Lenz's law)	1. Make the connections of galvanometer with coil. 2. Perform the relative motion between coil and magnet. 3. Observe the induced voltage and current.	EIG107-3
6	Connect resistances in series and parallel connection and measure its resistances by using Ohm's law. Verify if by multi-meter.	1. Build the circuit as per circuit diagram. 2. Record currents and voltages. 3. Calculate resistance and verify using formulae.	EIG107-4
7	Use rheostat as a current regulator.	1. Build the circuit as per circuit diagram. 2. Record currents and voltages. 3. Calculate resistance required for current regulation.	EIG107-4
8	Use rheostat as a potential divider.	1. Build the circuit as per circuit diagram. 2. Record currents and voltages. 3. Calculate resistance required for voltage regulation.	EIG107-4
9	Calculate R, L and power factor of series RL circuit by measuring voltages and currents in circuit.	1. Build the circuit as per circuit diagram. 2. Record currents, voltages and power. 3. Calculate resistance, inductance, pf, KVA and KVAR.	EIG107-5
10	Calculate R, C and power factor of series RC circuit by measuring voltages and currents in circuit.	1. Build the circuit as per circuit diagram. 2. Record currents, voltages and power. 3. Calculate resistance, capacitance, pf, KVA and KVAR.	EIG107-5
11	Calculate R, L, C and power factor of series RLC circuit by measuring voltages and currents in circuit.	1. Build the circuit as per circuit diagram. 2. Record currents, voltages and power. 3. Calculate resistance, reactance, pf, KVA and KVAR.	EIG107-5
12	To study construction of single phase low voltage transformers.	1. Draw the diagram of construction of transformer. 2. Identify the different parts of transformer. 3. Identify the type of transformer.	EIG107-6

B. Theory

Section I

Sr. no.	Topics Subtopics	Teaching (Hours)	Theory evaluation Marks
EIG107-1: Apply basic laws and principles of electrical engineering to electrical applications.			
1	BASIC LAWS AND PRINCIPLES OF ELECTRICAL ENGINEERING 1. Definition of electric current and potential difference. Concept of voltage drop and terminal voltage. 2. Concept of resistance and conductance Laws of resistance (Simple Numerical) Concept of resistivity and conductivity 3. Classification of electric current: Direct current (DC) & alternating current (AC) 4. Concept of power and energy with simple numerical. (in DC circuit) 5. Series and parallel connection of resistances. (Simple numerical) 6. Theorems for DC circuits: Ohm's Law (Simple Numerical) Kirchhoff's Laws (Simple Numerical with maximum two equations)	10	12
EIG107-2: Use principles of magnetic circuits to calculate various parameters in magnetic circuits.			
2	MAGNETIC CIRCUITS 1. Magnetic Circuit - Ohm's law of magnetic circuit. 2. Definitions concerning magnetic circuit: Magneto-Motive-Force (MMF), Ampere Turns (AT), Reluctance, Permeance, Reluctivity. 3. Comparison between electric and magnetic circuit. 4. Calculations of ampere-turns for simple series magnetic circuit (Simple Numerical) 5. Concept of leakage flux, leakage coefficient, useful flux & fringing. 6. Concept of magnetization curve (B - H Curve) Magnetization curve for magnetic and non-magnetic materials. 7. Concepts of magnetic hysteresis, hysteresis loop. Hysteresis loops for hard & soft magnetic materials. Significance of area of hysteresis loop, hysteresis loss. (No Derivation and No Numerical), Definition of eddy current loss and it formula. 8. Concepts of permanent magnet and electromagnet.	08	16
EIG107-3: Understand basic principles of electromagnetic induction.			
3	ELECTROMAGNETIC INDUCTION 1. Faraday's laws of electromagnetic induction. (Simple Numerical) 2. Induced E.M.F: Statically induced E.M.F., dynamically induced E.M.F. (Simple Numerical) 3. Direction of induced E.M.F. and currents. Fleming's right hand rule, Lenz's law. 4. Basic concepts of self induction and mutual induction. (No	06	12

Sr. no.	Topics Subtopics	Teaching (Hours)	Theory evaluation Marks
	numerical) 5. Basic principle of elementary alternator. 6. Energy stored in magnetic field (No Derivation and No Numerical) 7. Lorentz force principle (Simple numerical). Fleming's left hand rule.		
		24	40

Section –II

Sr. no.	Topics/Subtopics	Teaching (Hours)	Theory evaluation Marks
EIG107-4: Apply basic principles of AC circuits in electrical devices.			
4	AC FUNDAMENTALS 1. Generation of alternating EMFs. 2. Definitions of some important terms.: cycle, time period, frequency, amplitude, average values, rms value. 3. Equations of alternating voltages and currents. 4. Concept of effective or root mean square (R.M.S.) value of sinusoidal current or voltage. 5. Peak factor and form factor. 6. Phasor representation of alternating quantities. 7. Phase and phase difference, concept of lagging and leading 8. Addition and subtraction of sinusoidal alternating quantities. (Simple Numerical)	10	16
EIG107-5: Understand circuit parameters in AC circuit.			
5	AC CIRCUITS (NO NUMERICAL) 1. Star and delta connections of resistive load. Comparison between star and delta connections of load. 2. A.C. circuits Purely resistive A.C. circuit. Purely inductive A.C. circuit. Purely capacitive A.C circuit. 3. Series A.C. circuits and concept of power factor Circuit with resistance and inductance in series Circuit with resistance and capacitance in series Circuit with resistance inductance and capacitance in series 4. Active and reactive power in single phase series circuit.	08	16
EIG107-6: Apply basic laws of electromagnetic induction principles in electric machines.			
6	ELECTRIC MACHINES (NO NUMERICAL) 1. Basic principle of working of a single phase transformer. 2. Construction of a single phase transformer. 3. Types of transformer based on	06	08

	Construction of core of transformers Number of phases Functions of transformer (instrument, power, isolation) 4. Application of transformers in electronic circuit. 5. Basic principle of working of single phase squirrel cage induction motor. 6. Basic principle of working of DC motor. Compare shunt and series DC motors. 7. Basic principle of earthing, necessity of earthing, types of earthing (pipe earthing and plate earthing)		
		24	40

Specification table for setting question paper for semester end theory examination

Section / Topic no.	Name of topic	Distribution of marks Cognitive based (level wise)			Total marks	Course outcome
		Remember	Understanding	Application		
I / 1	Basic Concepts	04	04	04	12	EIG107-1
I / 2	Magnetic Circuits	04	06	06	16	EIG107-2
I / 3	Electromagnetic Induction	4	4	4	12	EIG107-3
II / 4	AC Fundamentals	4	4	8	16	EIG107-4
II / 5	AC Circuits	4	4	8	16	EIG107-5
II / 6	Electric Machines	2	2	4	8	EIG107-6

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	2
3	Neat & complete Diagram.	4
4	Observations & equipment handling skill	2
5	Safety and precautions procedure in lab	4
6	Oral Based on Lab work	4
7	Completion of task	4
	Total	50

Instructional Strategies:

a) Instructional Methods

1. Lectures and discussions.
2. laboratory experiences and laboratory interactive sessions.

3. Time bound assignments.

b) Teaching and Learning resources, including references:

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

REFERENCE MATERIAL:

1. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN :978-0-07-0088572-5
2. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015
3. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015
4. Basic Electrical Engineering by V.K Mehta (Author), Rohit Mehta; S. Chand publications.
5. <https://www.electrical4u.com/>
6. <https://circuitglobe.com/>

COURSE ID:

Course Name : ENGINEERING GRAPHICS (EE/IT/IE/ET)
Course Code : CCG109
Course Abbreviation : GEGR

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	
Details of Evaluation	--	i. . Progressive assessment of practical work for 25 marks is to be carried out by course teacher	--	i. External Practical Exam (2 Hrs) for 50marks. Assessment by internal & external examiners	-	
Marks	--	25	--	75 E	-	75

* Assessment as per Pro-forma – I

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 using i) Procedures ii) Practices iii) Drawing Instruments iv) Accuracy v) Drafting Skill

COURSE OUTCOMES :

CCG109-1 Understand various fundamentals in engineering drawing.

CCG109-2 Produce the projection of point, lines & planes inclined to one reference plane.

CCG109-3 Produce orthographic drawing from given pictorial view.

CCG109-4 Produce sectional orthographic drawing from given pictorial view.

CCG109-5 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 outcome POs and PSO's								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation & testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Manag.	PO 7 Life-long learning	PSO1 Work in mfg & service sector	PSO 2 Start entrepre-neurial activity
Competency:	-	-	-	-	-	-	-	-	-
CCG109-1	3	-	-	-	-	-	-	-	-
CCG109-2	3	-	-	1	1	-	-	-	-
CCG109-3	3	-	1	-	-	-	-	-	-
CCG109-4	3	-	2	-	1	-	1	1	1
CCG109-5	3	-	1	-	-	-	1	2	-

CONTENT:

A) PRACTICALS:

List of Practical:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Lines and Lettering (1 Sheet)	To develop drawing skill	CCG109-1
2	Projections of line (1 Sheet)	To develop drawing ability in Projections of line	CCG109-2
3	Projections of Planes (1 Sheet)	To develop drawing ability in Projections of Planes	CCG109-2
4	Orthographic & Sectional orthographic projection one problem each (1 Sheet)	To develop drawing ability to draw Orthographic projection and sectional orthographic projection	CCG109-3 & CCG109-4
5	Isometric Drawing (1 Sheet) Isometric views & Isometric Projections of one object each	To develop ability to draw Isometric Drawing	CCG109-5

1. THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCG109-1 Understand 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 Dimensioning technique as per SP-46 (Latest Edition) 1.6 Types and applications of chain, parallel and Co-ordinate dimensioning	06	10
CCG109-2 Produce 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)	06	06
CCG109-2 Produce 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 Shapes Inclined to One Reference Plane and perpendicular to other Reference Plane. (Planes in First Quadrant Only)	04	06

Section II

CCG109-3 Produce 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 (Simple objects only)	06	08
CCG109-4 Produce sectional orthographic drawing from given pictorial view.			
5	Sectional Views.		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.1 Types of sections 5.2 Conversion of pictorial view into sectional Orthographic views. (First Angle Projection Method only) (Simple objects only)	04	08
CCG 109-5 Visualize & 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(Simple objects 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	02	02	04	08
5	Sectional Views.	02	02	04	08
6	Isometric Projection	04	02	06	12
	TOTAL	16	12	22	50

Semester end external 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.

ASSESSMENT CRITERIA FOR TERM WORK

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

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 (IE/ET)**
Course Code : **CCG114**
Course Abbreviation : **GWSD**

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			Total
	Theory	Practical	Theory	Practical *	TW	
Details of Evaluation	--	i. . Progressive assessment of practical work for 25 marks is to be carried out by course teacher	--	i. External Practical Exam (2 Hrs) for 50marks. Assessment by internal & external examiners	-	
Marks	nil	--	--	50	-	50

** Assessment as per Pro-forma – III*

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 attitude of i) Interpret drawing ii) Safety

COURSE OUTCOMES :

CCG 114-1 Select different types of wood material.

CCG 114-2 Select different types of tools used in workshop.

CCG 114-3 Preparing simple components in workshop.

CCG 114-4 Interpret drawing.

CCG 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							PSO 1 Operate & Maintain,	PSO 2 Supervision & Providing Solutions
	PO 1 Basic and discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design /development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability and environment	PO 6 Project Management	PO 7 Life-long learning		
Competency:	1	-	-	3	-	-	-	2	2
CCG114-1	1	-	-	3	-	-	-	2	2
CCG114-2	1	-	-	3	-	-	-	2	2
CCG114-3	1	-	-	3	-	-	-	2	2
CCG114-4	1	-	-	3	-	-	-	2	2
CCG114-5	1	-	-	3	-	-	-	2	2

CONTENTS:

A) PRACTICALS

Sr. No.	Topics/ Sub-Topics	Practical (Hours)/ Evaluation (Marks)	Skills/ Competencies to be developed	Course outcome
1	Wood Working shop :-	10/18		

	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		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	CCG1 to CCG 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	CCG 2 to CCG 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 4)Bucket 5) Tray 6) Trunk 7) Tin box Batch size should be selected depending volume of work	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	CCG2 to CCG 5

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 PRACTICAL AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical 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 Practical 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

COURSE ID:

Course Name : SPORTS & YOGA
Course Code : CCG117
Course Abbreviation : GSPY

TEACHING 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			Total
	Theory	Practical	Theory	Practical *	TW	
Marks	Non Credit Course (N.A.)					

RATIONALE:

Nowadays, Yoga and Sports have become an integral part to lead healthy life. Considering the need of society and industry, this course has been designed with theoretical foundation and practical demonstration. The main objective of the course is to acquire natural tranquility and steadiness of the mind. For acquiring mastery and perfection in Yoga and Sports, consistent practice is necessary.

COMPETENCY : Apply principles of Yoga and Sports in daily life.

COGNITIVE : Understanding and applying principles of Yoga and Sports in various situations.

AFFECTIVE : Attitude of i) Perfection, ii) Confidence and iii) Presentation.

PSYCHOMOTOR : i) Use of correct Yoga posture. ii) Practice of correct breathing. iii) Practice team work.

COURSE OUTCOMES:

On successful completion of the course the students will be able to:

CCG117-1: Practice Physical activities and Yoga for strength, flexibility, and relaxation.

CCG117-2: Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.

CCG117-3: Learn breathing exercises and healthy fitness activities

CCG117-4: Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.

CCG117-5: Perform yoga movements in various combination and forms.

CCG117-6: Assess current personal fitness levels.

CCG117-7: Identify opportunities for participation in yoga and sports activities.

CCG117-8: Develop understanding of health-related fitness components: cardio respiratory endurance, flexibility and body composition etc.

CCG117-9: Improve personal fitness through participation in sports and yogic activities.

CCG117-10: Develop understanding of psychological problems associated with the age and lifestyle.

CCG117-11: Demonstrate an understanding of sound nutritional practices as related to health and physical performance.

CCG117-12: Assess yoga activities in terms of fitness value.

CCG117-13: Identify and apply injury prevention principles related to yoga and physical fitness activities.

CCG117-14: Understand and correctly apply biomechanical and physiological principles related to exercise and 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	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1	PSO2
Competency Apply principles of Yoga and Sports in daily life	3	2	3	-	2	2	2		
CCG117-	2	2	2	-	-	-	-		
CCG117-2.	3	2	3	-	2	-	2		
CCG117- 3	2	2	3	-	2	2	1		
CCG117-4	2	2	2	-	2	-	2		
CCG117-5	2	2	2	-	-	-	-		
CCG117-6.	2	2	3	-	2	-	-		
CCG117-5	3	2	3	-	2	2	2		
CCG117-8	2	2	2	-	-	-	-		
CCG117-9	3	2	3	-	2	-	2		
CCG117-10	2	2	3	-	2	2	1		
CCG117-11	2	2	2	-	2	-	2		
CCG117-12	2	2	2	-	-	-	-		
CCG117-13	2	2	3	-	2	-	-		
CCG117-14	2	2	2	-	-	-	-		

CONTENT:

Sr. No.	Topics / Sub-topics
1	Introduction to Physical Education o Meaning & definition of Physical Education o Aims & Objectives of Physical Education o Changing trends in Physical Education
2	Physical Fitness, Wellness & Lifestyle o Meaning & Importance of Physical Fitness & Wellness o Components of Physical fitness o Components of Health related fitness o Components of wellness

	<ul style="list-style-type: none"> o Preventing Health Threats through Lifestyle Change o Concept of Positive Lifestyle
3	Introduction to Ashtang Yog <ul style="list-style-type: none"> o Meaning & Importance Yam, Niyam, Asan, Pranayam, Pratyahar, Dharana, Dhyan & Samadhi
4	Postures <ul style="list-style-type: none"> o Meaning and Concept of Postures. o Causes of Bad Posture. o Advantages & disadvantages of weight training. o Concept & advantages of Correct Posture. o Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis. o Corrective Measures for Postural Deformities
5	Yoga <ul style="list-style-type: none"> o Meaning & Importance of Yoga o Elements of Yoga o Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas o Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana) o Relaxation Techniques for improving concentration - Yog-nidra
6	Pranayam & its types <ul style="list-style-type: none"> o Meaning & Importance of Pranayam o Breathing Exercises : Slow & Fast, Kapalabhati 1.Nadishodhan (Anulom- Vilom) 2.Sheetali 3.Sitkari 4.Ujjayi 5.Bhramari 6.Bhastrika
7	Yoga & Lifestyle <ul style="list-style-type: none"> o Asanas as preventive measures. o Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana. o Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana. o Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. o Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana. o Asthma: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.
8	Sun Salutation (Suryanamaskar)

	<ul style="list-style-type: none"> o Meaning and concept of Suryanamaskar o Postures o Use of breathing techniques and Mantras
9.	Yogasan <ul style="list-style-type: none"> o Meaning and Importance of Yogasan o Types of Yogasan : Naukasan, Dhanurasan, Garudasan, Virasan, Sarvangasan, Matsyasan, Parighasan, Ushtrasan, Hansasan & Mayurasan
10	Prayer <ul style="list-style-type: none"> o Meaning and Importance of Prayer o Omkar Chanting o Meditation & Mudras
11.	Psychology & Sports <ul style="list-style-type: none"> o Definition & Importance of Psychology in Physical Edu. & Sports o Define & Differentiate Between Growth & Development o Adolescent Problems & Their Management o Emotion: Concept, Type & Controlling of emotions o Meaning, Concept & Types of Aggressions in Sports. o Psychological benefits of exercise. o Anxiety & Fear and its effects on Sports Performance. o Motivation, its type & techniques. o Understanding Stress & Coping Strategies.
12.	Sports / Games Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. <ul style="list-style-type: none"> o History of the Game/Sport. o Latest General Rules of the Game/Sport. o Specifications of Play Fields and Related Sports Equipment. o Important Tournaments and Venues. o Sports Personalities. o Proper Sports Gear and its Importance.

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

NO THEORY EXAMINATION

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION :

NO PRACTICAL EXAMINATION

INSTRUCTIONAL STRATEGIES:

A. INDUSTRIAL EXPOSURE:

SN	Mode of Exposure	Topic
1.	Visit to nearest Yoga & Sports Centre	Syllabus

B. INSTRUCTIONAL METHODS:

1. Lectures and Demonstrations with Practices
2. Yoga room & Ground Practices

C. TEACHING AND LEARNING RESOURCES:

1. LCD Projector
2. Visual Streaming

REFERENCE MATERIAL:

Books :

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light On Yoga By B.K.S. Iyengar.
3. Light on Yoga: The Classic Guide to Yoga by the World's Foremost Authority Paperback –by B.K.S. Iyengar
4. Light on the Yoga Sutras of Patanjali Kindle Edition by B. K. S. Iyengar
5. Yoga For Sports: A Journey Towards Health And Healing Kindle Edition by BKS Iyengar

* * *

COURSE ID:

Course Name : ENGINEERING MATHEMATICS (EE/IE/ET/IT)
Course Code : CCG118
Course Abbreviation : GEMB

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : CCG105 Basic Mathematics

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	

Evaluation Scheme :

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

RATIONALE:

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

Competency:

Apply principles of Engineering Mathematics to solve Engineering problems 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) :

CCG118-1 : To understand and solve examples of complex numbers.

CCG118-2 : To solve problems on two dimensional co-ordinate geometry for straight line.

CCG118-3 : To find approximate solution of algebraic equations and simultaneous equations by various methods.

CCG118-4 : To find limits of different types of functions using various methods.

CCG118-5 : To 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	PO 1 Basic & Discipline specific knowledge	PO 2 Problem analysis	PO 3 Design / development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life –long learning	PSO1 Plan & Design	PSO2 Construction & Maintenance
Competency: Apply principles of Engineering Mathematics to solve Engineering problems	3	2	2	2	1	-	3		
CCG118-1	3	2	2	2	1	-	3		
CCG118-2	3	2	2	2	1	-	3		
CCG118-3	3	2	2	2	3	-	3		
CCG118-4	3	2	2	2	1	-	3		
CCG118-5	3	2	2	2	3	-	3		

CONTENT:

A) TUTORIALS:

Note - Tutorials are to be used to get enough practice

Sr No.	Topic	Tutorial Content (10 problems in each tutorial)
1	Complex Number	Solve problems based on algebra of complex numbers & De- moivre's theorem
2		Examples on different forms of straight line.

3	Straight line	Examples on to find perpendicular distance of a point from a line, angle between two lines, intersection of lines.
4	Numerical solution of Algebraic & simultaneous Equations	Numerical solution of algebraic equations.
5		Numerical solution of simultaneous equations
6	Functions	Examples on value of functions, Odd & Even functions , Composite functions
7	Limits	Evaluation of limits by Factorization, Rationalization, Simplification, Infinity method
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.

B) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>Course outcome CCG106-1 : To understand and solve examples of complex numbers.</i>		
1	Complex Number 1.1 Definition ,Algebra of complex numbers, simple examples 1.2 Polar form, Exponential form 1.3 De- Moivre's theorem	06	10
	<i>Course outcome CCG106-2 : To solve problems on two dimensional co-ordinate geometry of straight line.</i>		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>Course outcome CCG106-1 : To understand and solve examples of complex numbers.</i>		
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	10
	<i>Course outcome CCG106-3 : To find approximate solution of algebraic equations and simultaneous equations by various methods.</i>		
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)
	<i>Course outcome CCG106-4: To find limits of different types of functions using various methods.</i>		
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	04	06
7	Limits 7.1 Definition 7.2 Limits of algebraic functions by factorization, simplification, rationalization ,Limit as $x \rightarrow \infty$	05	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course outcome CCG106-4: To find limits of different types of functions using various methods.		
	Course outcome CCG106-5: 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
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)			Total Marks
		Knowledge	Comprehension	Application	
1	Complex Number	4	2	4	10
2	Straight line	2	2	6	10
3	Numerical solution of Algebraic Equations and simultaneous Equations	2	2	16	20
4					
5	Functions	2	-	4	6
6	Limits	2	2	4	8

7	Differentiation	4	4	12	20
8	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.

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Demonstrations
2. Tutorials

Teaching and Learning resources:

1. Chalk board
2. Item Bank
3. MSBTE videos

REFERENCE MATERIAL:

a) Books:

Sr. No.	Author	Title	Publisher
1	G.V. Kumbhojkar	Engineering Mathematics III	Phadake Prakashan, Kolhapur
2	B.S. Grewal	Higher Enggining Mathematics	Khanna Publication, New Dhelhi
3	H.K.Das	Higher Enggining Mathematics	S.Chand Publication, New Dhelhi
4	Patel, Rawal and others	Engineering Mathematics	Nirali Prakashan, Pune
5	P.M.Patil and Others	Engineering Mathematics	Vision Prakashan, Pune
6	Mathematics for Polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan
7	Sameer Shaha	Engineering Mathematics	Tech-Max Publication, Pune
8	A.M. Vaidya	Applied Mathematics	Central Techno, Publication

b) Websites:

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

LEVEL- II

LIFE SKILLS AND PROFESSIONAL SKILLS COURSES

COURSE ID:

Course Name : INTRODUCTION TO IT SYSTEM (CE/ME/EE/MT/IE/ET/IT)
Course Code : CCG201
Course Abbreviation : GITS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	2	4
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	--	25 marks for each practical One PST of 25 marks	--	--	As per Proforma-II	
Marks	--	--	--	--	50I	50

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.

This course is intended to make students comfortable with computing environment - Understanding Computer Hardware, Learning basic computer skills, basic application software tools, basic knowledge and applications of Internet and Cyber security awareness.

COMPETENCY:

Apply Fundamental knowledge of computer system to work with simple applications.

Cognitive: i) State the basic parts of a computer system and relationships among component.

ii) Describe characteristics and functions of CPU's, motherboard, RAM, Storage devices

Psychomotor: i) Identify computer system and Network ii) Create word documents, spreadsheets and presentation

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

COURSE OUTCOMES:

CCG201-1: State basic components & applications of a computer system.

CCG201-2: Classify system and application software of a computer system.

CCG201-3: Design files of word processors, spreadsheets, presentation software, and database application

CCG201-4: Describe importance of Internet and cyber law.

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

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

PO →	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2
CO ↓	Basic and discipline specific knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools, experimentation and testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong Learning	Design and development	Database and Network management
COMPETENCY- Apply Fundamental knowledge of computer system to work with simple applications	3	1	3	2	2	1	3	2	1
CCG201-1	3	0	0	2	1	-	2	-	-
CCG201-2	3	1	0	2	1	0	2	-	-
CCG201-3	3	3	3	3	2	1	-	2	1
CCG201-4	3	0	0	2	3	-	3	-	1

CONTENT:

A) LABORATORY WORK/PRACTICALS:

Laboratory experiments and related skills to be developed:

Sr. No.	Title of Experiment	Skills to be developed	Course outcome
1.	Identify system unit ,connections of internal components and input/output devices.	Identify different components inside the CPU cabinet. Identify input/output and storage devices..	CCG201-1
2.	Manage files and folders.	Create, copy, rename, delete, move files and folders.	CCG201-1
3.	Install and configure device driver for printer and scanners	Install driver software for a printer, Scanner Set up a printer & scanner Scan a page, print a test page	CCG201-1 & CCG201-2

4.	Identify configuration of OS & Computer system.	<ul style="list-style-type: none"> Understanding the concept of system and application software. Use start icon, taskbar, Recycle Bin, My Computer icon, The Recycle Bin and deleted files Creating shortcuts on the desktop 	CCG201-2
5.	Creating and Editing a word document	<ul style="list-style-type: none"> Use of menus and submenus. Type and format the text matter in paragraphs. Set up page size, margins Insert headers and footers, bullets. Use of borders and shading Format picture, word-art, text box etc. Typing text in multi-columns Use of equation editor 	CCG201-3
6.	Inserting table and Mail-Merge	<p>Table:</p> <ul style="list-style-type: none"> Insert, format Table. Sort data in table <p>Mail-Merge:</p> <ol style="list-style-type: none"> Create main document and data source Merge the main document and data source. Merge to file and merge to print. 	CCG201-3
7.	Creating and Editing a Spreadsheet	<ul style="list-style-type: none"> Use of menus and submenus. Creating a table in worksheet. Insert formulas, IF condition and functions. Apply sort, filter and data validations. Set up page size, margins. & set the print area. 	CCG201-3
8	Creating and editing a presentation.	<ul style="list-style-type: none"> Insert new / duplicate slides Create objects on a slide and use general editing operations. Use of different views in presentation Apply standard templates for slides. Use preset animation, slide transition and Prepare speaker notes. 	CCG201-3
9	Apply advance features of slide-show	<ol style="list-style-type: none"> Use of custom animation effect Use of action buttons on slides Rehearse time-setting of slide show 	CCG201-3
10	Internet Basics	<ul style="list-style-type: none"> Check internet connections & its properties. Configure Browser settings and use browser. Use search engines. Visit various website, Digital India portals (state and national portals) and college portals 	CCG201-4
10	Making use of Internet (Email, virus protection.)	<ul style="list-style-type: none"> Register for e-mail ID. Communicate with others using e-mail Installation, use of Anti-virus software, 	CCG201-4
11	Mini Project	Mini Project based presentation, database & spreadsheet handling, word processing skills.	CCG201-1 to -4

B) THEORY:

Sr. No.	Topics / Sub-topics	Lectures (Hours)
CCG201-1: State basic components & applications of a computer system.		
1	INTRODUCTION TO COMPUTERS 1.1 Introduction to Information Technology 1.2 Basic computer components:- Block of Computer System, I/O Unit, CPU, ALU, Memory Unit. 1.3 Internal System Components:- Processor, Motherboards, RAM, ROM, Graphics Cards, Sound Cards, HDD, SSD (Introduction to latest devices for all above points) 1.4 External System Components:- Introduction to <u>Input Devices</u> -Keyboards, mouse, joystick, pen, scanners, (Introduction to latest types) <u>Output Devices</u> -Monitors, Projectors, Speakers, Printers (Introduction to latest types) 1.5 Secondary Storage Devices:- CD/DVD, USB/ Flash Drives, External Hard Disks (Introduction to latest types) 1.6 Applications of IT –Education, Medical, Computer application in Offices, data analysis, accounting, Investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, design and research work, financial transaction terminals.	6
CCG201-2: Classify system and application software of a computer system.		
2	INTRODUCTION TO SOFTWARE 2.1 Types of software 2.1.1 System software – Introduction to Operating System (Various Examples of Desktop and Mobile Operating Systems), Device Drivers, Device Manager 2.1.2 Application Software: Terminology, Examples – Word Processing, Spreadsheets, Presentation tool, Image & Video Editing Software, Database Management applications	4
CCG201-3: Design files of word processors, spreadsheets, presentation software, and database application.		
3	WORD PROCESSING AND SPREAD SHEETS: 3.1 Creating and Editing a Document 3.1.1 Changing Layout of a Document (Design, Margins, Page Orientation, Borders, Themes, Watermark) 3.1.2 Inserting Elements to Word Documents (Shapes Charts, Image, Header Footer, Page number) 3.1.3 Working with Tables 3.1.4 Mail Merge 3.2 Creating and Editing a Spreadsheet 3.2.1 Changing Layout of a Spreadsheet (Design, Margins, Page Orientation, Borders,) 3.2.2 Inserting Elements to Spreadsheet (Shapes Charts, Image, Header Footer, Page number) 3.2.3 Working with Formulas and Data Validation 3.2.4 Working with Sorting and Filtering	8
4	PRESENTATION AND DATABASE: 4.1 Creating and Editing a Presentation 4.1.1 Changing Layout of a Presentation (Slide Design, Orientation, Themes,	6

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	Animation) 4.1.2 Inserting Elements to Presentation (Shapes Charts, Image, Header Footer, Page number) 4.1.3 Preparing Slide Show 4.2 Creating and Editing a Database	
CCG201-4: Describe importance of Internet and cyber laws.		
5	COMPUTER NETWORKS 5.1 Basic elements of a communication system 5.2 Introduction to Digital & Analog data 5.3 Types of Networks : LAN, MAN, WAN 5.4 Virus, Types of Viruses, Virus Protection	4
6	INTERNET & CYBER LAWS 6.1 Internet basic terminology – Web page , Web site, WWW, HTTP, HTML, 6.2 Client, server concepts 6.3 Introduction to ISP with example 6.4 Various examples of Browsers, Search Engines 6.5 Awareness about Digital India portals (state and national portals) and college portals. 6.6 Introduction to Cyber Law 6.7 Information Technology Act of India 2000, 2008	4

Progressive Skills Test:

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	02
3	Neat & complete Diagram.	04
4	Observations & computer handling skill	02
5	Use of toolbar, menu bar and short cut keys.	04
6	Logical thinking and approach	04
7	Oral Based on Lab work and completion of task	04
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.	Technical ability	20
2.	Communication skill	10
3.	Logical approach	20
	TOTAL.	50

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

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

Teaching and Learning resources:

1. Chalk board
2. Slides (PPT)
3. Self-learning Online Tutorials

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

- i) https://www.tutorialspoint.com/computer_fundamentals/index.htm
- ii) <http://kvsecontents.in/computer-fundamentals>
- iii) <https://www.javatpoint.com/computer-fundamentals-tutorial>
- iv) https://www.tutorialspoint.com/information_security_cyber_law/quick_guide.htm
- v) https://www.tutorialspoint.com/internet_technologies/internet_overview.htm

**

COURSE ID:

Course Name : COMMUNICATION SKILLS
Course Code : CCG203
Course Abbreviation : GCMS

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			Total
	Theory	Practical	Theory	Practical *	TW	
Details of 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 (02 hours)	Term End Practical Exam (02 hours)	As per Proforma II.	
Marks	10	--	40	50 I	--	100

I- Internal Examination

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

RATIONALE:

Communication being an integral part of every personal and professional human activity, communication skills plays a fundamental role in education as well as technology. As a unanimous feedback from the industry in general, technicians need to be specially strengthened in 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

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

Psychomotor : i) Use of correct pronunciation, tone, accent & intonation

ii) writing formal letters, drafts, reports, draft e-mails and prepare technical documents etc.

iii) Use of correct nonverbal code in formal & informal situations

iv) Speaking in formal & informal situations

COURSE OUTCOMES :

- CCG203-1 Understand the concept of Communication and identify Communication barriers.
CCG203-2 Deliver Speeches to express thoughts, ideas and emotions.
CCG203-3 Write letters, reports, and E-mail in correct language.
CCG203-4 Make effective use of body language & graphical communication.
CCG203-5 Prepare and present simple media aided presentation.
CCG203-6 Prepare and face 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]

	PO 1 Basic and Discipline specific knowledg e	PO 2 Problem Analysis	PO 3 Design / Developm ent of solutions	PO 4 Enginee ring Tools, Experi mentati on and Testing	PO 5 Engineeri ng Practices for society, sustainab ility and Environ ment	PO 6 Proje ct Mana geme nt	PO 7 Life- long Learn ing	PSO 1	PSO 2
Competency : Apply principles of communication to communicate in formal and informal scenario.	3	2	3	-	2	2	2		
CCG203-1	2	2	2	-	-	1	-		
CCG203-2	3	2	3	-	2	-	2		
CCG203-3	2	2	3	-	2	2	1		
CCG203-4	2	2	2	-	2	-	2		
CCG203-5	2	2	2	-	-	-	-		
CCG203-6	2	2	3	-	2	-	-		

CONTENT:

A) ASSIGNMENTS:

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical assignments as given 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	CCG203-1
2.	My Communication Barriers	Self analysis	CCG203-1
3.	Oral Communication : Prepared Speech	Preparing and delivery	CC G203-2

4.	Oral Communication : Extempore Speech	Creative thinking and speaking	CC G203-2
5.	Oral Communication : Conversation	Listening, thinking and speaking	CC G203-2
6.	Oral Communication : Group Discussion	Listening, thinking and convincing	CC G203-2
7.	Oral Communication : Group Debate	Listening, thinking and convincing	CC G203-2
8.	Written Communication : Writing formal Letters	Drafting	CCG203-3
9.	Written Communication : Writing Reports	Drafting with comprehension	CCG203-3
10.	Written Communication : Drafting of E-mail	Drafting	CCG203-3
11.	Written Communication : Technical Writing	Drafting	CCG203-3
12.	Non-verbal Communication : Graphic Communication	Graphic skills	CCG203-4
13.	Non-verbal Communication : Body Language	Body language	CCG203-4
14.	Using Presentation Aids	Preparing Presentation Aids	CCG203-5
15.	Interview Techniques	Facing an Interview	CCG203-6

B) THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	COURSE OUTCOME CCG203-1 Understand the concept of Communication and identify Communication barriers.		
1	Introduction to Communication 1.1 Definition and Importance of Communication 1.2 Model of communication 1.3 Principles of effective communication 1.4 Types of communication : Formal, Informal, Oral, Written, Verbal, Non Verbal, Horizontal, Upward and Downward. 1.5 Barriers in communication : Physical, Mechanical, Psychological and Language.	10	12
	COURSE OUTCOME CCG203-2 Deliver Speeches to express thoughts, ideas and emotions.		
2	Oral Communication 2.1 Characteristics of Oral Communication. 2.2 Tone, pronunciation and accents. 2.3 Spoken English: Conversation, Prepared and Extempore speech, Group Discussion and Debate.	08	04
	COURSE OUTCOME CCG203-3 Write letters, reports, and E-mail in correct language.		

3	Written Communication 3.1 Characteristics of written communication. 3.2 Writing Reports : Accident, Progress & Fall in Production 3.3 Letter Writing : Application with Resume, Enquiry Letter, Complaint Letter and Order Letter. 3.4 E-mail Drafting 3.5 Technical Writing:	12	10
	COURSE OUTCOME CCG203-4 Make effective use of body language & graphical communication.		
4	Non-verbal communication 4.1 Importance of Non-Verbal Communication. 4.2 Non Verbal Codes : Proxemics, Chronemics & Artefacts 4.3 Aspects of Body Language : Facial Expressions, Eye Contact, Vocalics, Gestures, Posture, Dress and Appearance & Haptics. 4.4 Graphical Communication : i) Advantages and Disadvantages of Graphical Communication. ii) Tabulation of Data and its depiction in the form of Bar Graphs and Pie Charts	06	06
	COURSE OUTCOME CCG203-5 Prepare 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.	06	04
	COURSE OUTCOME CCG203-6 Prepare and face Interview		
6	Interview Techniques 6.1 Types of Interview 6.2 Advantages of Mock Interview. 6.3 Facing an Interview	06	04
	Total	48	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	Introduction to Communication	02	06	04	CCG203-1	12
2	Oral Communication	00	02	02	CCG203-2	04
3	Written Communication	02	02	06	CCG203-3	10
4	Non-verbal Communication	02	02	02	CCG203-4	06
5	Media aided Presentation	00	02	02	CCG203-5	04
6	Interview Techniques	00	02	02	CCG203-6	04
	Total >>	06	16	18		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) INDUSTRIAL EXPOSURE:

(Included in *Workbook on Communication Skills*)

SN	Mode of Exposure	Topic
1.	Oral and Written Communication Exercises	Industrial situations
2.	Interview Techniques Exercises	Industrial situations

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

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	06
	Application	06
Psychomotor	Presentation Skills	04
	Drafting skills	05
Affective	Discipline and punctuality	02
	Decency	02
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 practical assignments shall be awarded as per *Assessment Pro-forma II*.

b) 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	Written	Total	Marks Converted out of
Marks >	25	25	50	25

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Demonstrations
2. Classroom practices
3. Self Learning Methods using Language Lab

Teaching and Learning Resources:

1. Chalk board
2. LCD Projector
3. Audio Visual Streaming
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.	M Ashraf Rizvi	Effective Communication Skills	Tata McGraw-Hill
3.	Burgoon Michael	Human Communication	SAGE Publications Inc.
4.	Sanjay Kumar & Pushp Lata	Communication Skills	Oxford University Press
5.	Barun Mitra	Personality Development & Soft Skills	Oxford University Press
6.	Geoffrey Leech and Jansvartvik	A communicative Grammar of English	Pearson Education ESL
7.	Elizabeth Hiemey	101 ways to better communication	Pustak Mahal
8.	Thomas Huckin and Leslie	Technical Writing and Professional Communication	McGraw 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>
- v) www.speaking-tips.com
- vi) www.notesdesk.com
- vii) www.studylecturenates.com
- viii) <http://learnenglish.britishcouncil.org/en/content>
- ix) www.languageabsystem.com

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COURSE ID :

Course Name : ENVIRONMENTAL SCIENCE. (ME/EE/IE/IT/ET/MT)
Course Code : CCG204
Course Abbreviation : GEVS

TEACHING AND EVALUATION SCHEME:

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

Scheme component	Hours / week	Credits
Theory	02	Nil
Practical	-	

RATIONALE :

Increase in environmental pollution and depletion of natural resources is causing depletion of ecosystem. Therefore it is necessary to conserve natural resources and to protect the environment. Environmental studies integrates Physical, Chemical and Biological sciences with the study of the environment. It provides interdisciplinary approach to the study of environmental system & gives solutions of environmental problems.

COMPETENCY :

Apply knowledge of environmental science to tackle environment related issues.

Cognitive : Understanding, interpreting issues of environment in engineering practices.

Affective : Skill of curiosity, interest and problem solving related to environmental issues

COURSE OUTCOMES :

CCG204-1 Develop public awareness about environment.

CCG204-2 Select alternative energy resources for Engineering Practices.

CCG204-3 Understand & conserve Ecosystem

CCG204-4 Apply techniques to reduce Environmental Pollution.

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 and discipline specific knowledge	PO 2 Problem analysis	PO 3 design/development of solutions	PO 4 Engineering Tools, experimentation and testing	PO 5 Engineering practice for society, sustainability and environment	PO 6 Project management	PO 7 Life-long learning	PSO1	PSO2
Competency: Apply knowledge of environmental science to tackle environment related issues.	3	2	1	-	3	1	3		
CCG204-1	3	1	1	-	3	1	3		
CCG204-2	3	2	1	-	3	1	3		
CCG204-3	2	1	1	-	2	1	3		
CCG204-4.	3	2	2	-	3	2	3		

CONTENT:

A) THEORY:

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG204-1 Develop public awareness about environment.			
1	ENVIRONMENT 1.1 Definition, need of environmental studies. 1.2 Segments of environment – Atmosphere, Hydrosphere, Lithosphere, Biosphere. 1.3 Environmental issues – Green house effect, Global warming, Acid rain, Ozone layer depletion. 1.4 Concept of 4R (Reduce, Reuse, Recycle & Recover).	6	NA
Course Outcome CCG204-2 Select alternative energy resources for Engineering Practices.			
2	ENERGY RESOURCES 2.1 Renewable, Non-renewable & Cyclic resources. 2.2 Causes & effects of depletion of resources. 2.3 Energy forms (conventional & non-conventional). 2.4 Energy conservation. 2.5 Over use of natural resources & its impact on Environment.	10	NA

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
Course Outcome CCG204-3 Conserve Ecosystem and biodiversity			
3	ECOSYSTEM 3.1 Ecosystem – Definition. 3.2 Division of ecosystem. 3.3 General characteristics of ecosystem. 3.4 Food chain.	4	NA
Course Outcome CCG204-4 Apply techniques to reduce Environmental Pollution.			
4	ENVIRONMENTAL POLLUTION 4.1 Definition of pollution. 4.2 Types – Natural & Artificial (Man made) 4.3 Soil / Land pollution – 4.3.1 Causes & effects on environment & lives. 4.3.2 Preventive measures. 4.4 Water pollution – 4.4.1 Sources of water pollution. 4.4.2 Effects on environment & lives. 4.4.3 Preventive measures. 4.4.4 BIS water quality standards. 4.4.5 Water conservation. 4.5 Waste water – 4.5.1 Generation (Domestic & Industrial). 4.5.2 Impacts. 4.5.3 CPCB norms of sewage discharge. 4.6 Air pollution – 4.6.1 Causes. 4.6.2 Effects. 4.6.3 Prevention. 4.7 Noise pollution – 4.7.1 Sources. 4.7.2 Effects. 4.7.3 Prevention. 4.7.4 Noise levels at various zones of the city. 4.8 Municipal solid waste, Bio-medical waste & e-waste – 4.8.1 Sources. 4.8.2 Generation. 4.8.3 Characteristics. 4.8.4 Effects & methods to manage.	12	NA

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

1. Lectures cum Discussions
2. Regular Home Assignments.
3. Visit to relevant Industries/ Public places

Teaching and Learning resources:

1. Chalk board.
2. Video clips.
3. Slides
4. Charts

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Nazaroff, William, Cohen, Lisa	Environmental engineering science.	Wiley, New York, 2000, ISBN 10;0471144940
2.	C.N.R.Rao	Understanding Chemistry	Universities press (India) Pvt. Ltd., 2011
3	Shashi Chawla	A text book of Environmental Studies.	Tata Mc Graw-Hill New Delhi.
4	Arvind Kumar	A text book of Environmental Science.	APH Publishing New Delhi.
5	Rao, C.S.	Environmental Pollution Control and Engineering.	New Age International Publication, 2007, ISBN: 81-224-1835-X

b) Websites

- i) <http://www.conserve-energy-future.com>
- ii) <http://www.cpcp.gov.in>
- iii) <http://www.indiaenvironmentportal.org.in>
- iv) <http://www.eco-prayerl.org>
- v) <http://www.sustainable.development.un.org>
- vi) <http://www.whatis.techtarget.com>

* * *

COURSE ID:

Course Name : **Essence of Indian Traditional Knowledge**
Course Code : **CCG205**
Course Abbreviation : **GITK**

TEACHING AND EVALUATION SCHEME:

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

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	00
Practical	00	

Evaluation Scheme :

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Marks	From the assessment of submission on given topics the teacher should evaluate the student and assign him grades as mentioned at ##.					

RATIONALE:

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.

The course is introduced to get knowledge in Indian Philosophical Foundations and to know Indian Languages and Literature and the fine arts in India & their Philosophy. It also aims to explore the Educational system, Science and Scientists of Ancient, Medieval and Modern India.

COMPETENCY :

Ability to interpret, connect up and explain basics of Indian traditional knowledge in modern scientific perspective.

Cognitive : Summarize philosophy of Indian culture and Distinguish the Indian languages and literature among difference traditions..

Psychomotor : Acquire the information about the fine arts in India.

Affective : Attitude of Unity in diversity, Tolerance and Universal acceptance, cultural synthesis and values of life.

COURSE OUTCOMES :

CCG205-1: Summarize and classify philosophy of Indian culture of ancient, medieval and modern India.

CCG205-2: Distinguish the Indian languages and literature among different traditions.

CCG205-3: Differentiate between Dharma and Religion.

CCG205-4 : Acquire the information about the fine arts in India.

CCG205-5: Study the contribution of education systems of different eras in India.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1	PSO2
Competency : Ability to interpret, connect up and explain basics of Indian traditional knowledge in modern scientific perspective.	-	-	-	-	1	-	-	-	-
CCG205-1	-	-	-	-	1	-	-	-	-
CCG205-2	-	-	-	-	1	-	-	-	-
CCG205-3	-	-	-	-	1	-	-	-	-
CCG205-4	-	-	-	-	1	-	-	-	-
CCG205-5	-	-	-	-	1	-	-	-	-

CONTENT:

B. Suggested Assignments:

Practical Assignments and related skills to be developed:

The following practical exercises / assignments shall be conducted and the student should be assessed for attainment of the competency (any 08 assignments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Write the definition of Health according to WHO and describe important components of it.	1) Interpret the definition of Health. 2) Understand different components of Health.	CCG205-1
2	Give introduction of any one Religious book.	1) Search different religious books. 2) Select a religious book of our own choice and study it.	CCG205-2
3	Collect information about “Anapansati”, the method of meditation. Conduct a session of Anapansati with your family members, submit photographs of the session, and discuss the after effects amongst the	1) Collect information about meditation methods. 2) Meditate and interpret the mental state before and after the meditation sessions.	CCG205-3

	meditators.		
4	Write an essay on any one Indian traditional festival. Prepare a relevant festival dish and submit a photograph of the dish.	1) Gather the information about Indian traditional festivals. 2) Understand the science and psychology behind the festive culture of India.	CCG205-3
5	Collect pictures / photographs of any five objects received during the excavation of “Sindhu culture” era and write their descriptions.	1) Search the pictures / photographs of ancient age. 2) Read and interpret information about our heritage.	CCG205-4
6	Prepare / construct any model (like pair of oxen, figurine of God or human face etc.) from soil, mud, clay or any other material	1) Construct a model using soil. 2) Enjoy the artistic experiences.	CCG205-4
7	Collect and write information of any five herbal medicinal plants. Grow one of them and submit the photograph.	1) Search herbal medicinal plants and interpret their applications. 2) Grow different types of plants.	CCG205-4
8	Collect information about “Nalanda University” and write a short-note about it with reference to its establishment, progress, contribution, causes of destruction etc.	1) Collect information of Indian ancient universities. 2) Interpret their contribution in building India as a nation.	CCG205-5
9	Write a descriptive note on the role of Indian mathematician in the development of mathematics.	1) Collect information about ancient Indian scientists and mathematicians. 2) Prepare a write-up of great Indian scientists – mathematicians.	CCG205-5
10	Prepare a role play (in a group of 5 / 6 students) based on “Daily life in Gurukul”.	1) Conduct a role play on any topic. 2) Understand value based education and its significance in daily life.	CCG205-5
11	Write a descriptive note on “Maritime Trade in Ancient India”.	1) Gather information about trad in ancient India. 2) Understand the position of India in world trade market and India’s contribution in it.	CCG205-4

C. THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	CCG205-1: Understand philosophy of Indian culture of ancient, medieval and modern India.	
1.	Introduction to Indian Philosophy: 1.1 Basics of Indian Philosophy 1.2 culture & civilization 1.3 culture and heritage 1.4 Importance of culture in human literature 1.5 General characteristics of Indian culture – Unity in diversity, Tolerance and Universal acceptance, वसुधैव कुटुम्बकम् (The World is a family), Freedom of worship (रुचीनां वैचित्र्यादृजुकुटिलनानापथजुषाम्। नृणामेको गम्यस्त्वमसि पयसामर्णव इव॥), Cultural synthesis- not cultural conflicts, unbroken traditions, 1.6 Indian culture Ancient India, Medieval India, Modern India.	4
	CCG205-2: Distinguish the Indian languages and literature among different traditions	
2.	Indian Philosophy & Literature: 2.1 Tradition of metaphysical knowledge 2.2 Vedas & Upanishads 2.3 Schools of Vedanta, and other religion Philosophical Literature 2.4 Philosophical Ideas 2.5 The role of Sanskrit 2.6 Significance of scriptures to current society Indian languages and literature of India.	6
	CCG205-3: Differentiate between Dharma and Religion.	
3.	Dharma, Religion and Philosophy: 3.1 Meaning of Dharma as duties of Human being, (जगतः स्थितिकारणं प्राणिनां साक्षात् अभ्युदयनिःश्रेयसहेतुर्यः स धर्मः, आगमानां हि सर्वेषाम् आचारः श्रेष्ठ उच्यते । आचारप्रभवो धर्मो धर्मादायुर्विवर्धते ॥) 3.2 Dharma and Religion 3.3 Religious Philosophy in ancient India 3.4 Religious Philosophy in Medieval India Religious Reform Movements in Modern India (selected movements only)	6

	CCG205-4 : Acquire the information about the fine arts in India	
4.	Indian Fine Arts & Its Philosophy (Art, ,ScienceTechnology & Engineering): 4.1 Indian Painting 4.2 Indian handicrafts 4.3 Music, divisions of Indian classic music, modern Indian music 4.4 Dance and Drama 4.5 Indian Architecture - ancient, medieval and modern Science and Technology in Indian, development of science in ancient, medieval and modern Indian.	8
	CCG205-5: Study the contribution of education systems of different eras in India	
5.	Education System in India: 5.1 The role of “Gurukulas” in Education System 5.2 Value based Education 5.3 Education in ancient, medieval and modern India, aims of education, subjects, languages Science and Scientists of Ancient India, Scientists of Medieval India, Scientists of Modern India.	8

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS

Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Understanding the objective	05
Psychomotor	Manual work and Observation	10
Affective	Discipline and punctuality	05
	Presentation of concept	05
TOTAL		25

Grade to the students should be allotted as follows:-

Range of continuous assessment marks	Grade
continuous assessment marks > 90	A +
90 = / > continuous assessment marks > 85	A
85 = / > continuous assessment marks > 80	B +
80 = / > continuous assessment marks > 75	B
75 = / > continuous assessment marks > 70	C +

70 = / > continuous assessment marks > 60	C
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INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Discussions 2. Collaborative mini projects. 3. Regular Home Assignments.

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3. PPT 4. Charts

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	श्रीनिवास हरी दीक्षित	भारतीय तत्वज्ञान	अजब पुस्तकालय, कोल्हापूर
2.	S. Radhakrishnan	Indian Philosophy Vol. 1	OUP India ISBN: 9780195698411, 9780195698411 Edition: 2009
3.	Suresh Soni	India's Glorious Scientific Tradition	Prabhat Prakashan ISBN: 9788184300284, 9788184300284
4.	प्रशांत पोळ	भारतीय ज्ञानाचा खजिना	
5.	Krishna Chaitanya	Arts of India	Abhinav Publications, 1987
6.	NCERT	“Position paper on Arts, Music, Dance and Theatre”	ISBN 81-7450-494-X, 2006
7.	Satya Prakash	“Founders of Sciences in Ancient India”	Vijay Kumar Publisher, 1989
8.	Altekar. A. S.	Education in ancient India.	Banaras: Nanda Kishore & Bros. 1948.

b) Websites

- I. [https://nios.ac.in/online-course-material/secondary-courses/indian-culture-and-heritage-\(223\)-syllabus.aspx](https://nios.ac.in/online-course-material/secondary-courses/indian-culture-and-heritage-(223)-syllabus.aspx)
- II. <http://ncert.nic.in/textbook/pdf/hei111.pdf>

COURSE ID:

Course Name : Indian Constitution
Course Code : CCG206
Course Abbreviation : GINC

TEACHING SCHEME:

Pre-requisite Course(s) : <nil >

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	NIL
Practical	NIL	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End			Total
	Theory	Practical	Theory	Practical *	TW	
Marks	From the assessment of submission on given topics the teacher should evaluate the student and assign him grades as mentioned at ##.					

RATIONALE:

The course is designed to have basic knowledge of our Constitution, Its formation and process of forming the constitution and its importance. Also it is expected that the student should at least know the political system of nation, state, district and village also.

The judiciary system is also important part in the life of person and it is expected that the diploma student must at least know the system and its provisions in brief.

COMPETENCY :

Ability to understand, connect up and explain basics of Indian constitution, Indian Politics and Indian judiciary in brief.

Cognitive : Understand philosophy of Indian Constitution and Politics.

Psychomotor : Acquire the information about Politics, Judiciary and constitutional provisions.

Affective: Know the provisions of constitutions and legal process of changing the provisions in constitutions, political impacts on human life and provisions in judiciary and there importance.

COURSE OUTCOMES :

CCG206-1: Understand philosophy of Indian constitution.

CCG206-2: Know the formation process of state and central Government.

CCG206-3: Concept of Union Territory and provisions.

CCG206-4 : Indian Politics .

CCG206-5: Study the Judiciary system in India.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimenta tion and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Managemen t	PO 7 Life- long Learning	PSO1	PSO2
Competency : Understand philosophy of Indian constitution	0	1	1	0	1	1	2		
CCG206-1	1	0	1	0	1	1	2		
CCG206-2	0	1	1	1	2	1	2		
CCG206-3	0	1	1	1	1	1	2		
CCG206-4	0	0	1	1	2	2	2		
CCG206-5	0	1	1	1	2	2	3		

CONTENT:

Suggested Assignments: It is expected that the student should prepare write up of at least 5 topics as a home work and submit report to the teacher before the grant of term.

THEORY :

SECTION-I		
Sr. No.	Topics / Sub-topics	Lectures (Hours)
1	Unit 1. The Constitution:- 1.1 Introduction. 1.2 The History of making of the Indian Constitution. 1.3 Basic structure and its interpretation. 1.4 Fundamental Rights and Duties and their interpretation	4
2	Unit 2 .Union Government 2.1 Structure of the Indian Union. 2.2 President –Role and power. 2.3 Prime minister and council of ministers. 2.4 Lok sabha and Rajya Sabha. 2.5 Union Territories and their limitations.	6
3	Unit 3. State Government. 3.1 Governor –Role and power. 3.2 Chief Minister and council of ministers. 3.3 State secretariat. 3.4 Administrative Regions of Maharashtra.	6

SECTION -II		
4	Unit.4 Local Administration:- 4.1 District Administration. 4.2 Municipal Corporation. 4.3 Zilla Panchayat 4.4 Taluka (Tahasil) Administration .	4
5	Unit 5. Election Commission. 5.1 Role and functioning. 5.2 Chief Election Commissioner –Appointment. 5.3 State Election Commission. 5.4 Elections and duties of government /Non government servants – introduction	6
6	Unit 6. Judiciary Provisions :- 1.1 Introduction 1.2 Different courts. 1.3 Government legal advisor-provisions. 1.4 Limitations of courts and co-ordination with Home department.	6

.ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS :- It is expected that the student should prepare write up of at least 5 topics as a home work and submit report to the teacher before the grant of term.

- 1.Indian constitution formation .
2. Indian constitution important provisions.
- 3.Formation of Indian government process.
- 4.Power of president and prime minister/important facilities to them.
- 5.District administration along with administareation at municipal corporation,tahasil and jilha panchayat.
- 6.Election commission and their responsibilities.
- 7.Judiciery system in india-District courts and their limitations.

Continuous Assessment of Practical Assignments: No practical's but student should write at least 5 assignments on above topics..

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum Discussions.

Teaching and Learning Resources:

1. Chalk board
2. Video clips
- 3.PPT
4. Suggested websites.

REFERENCE MATERIAL :

Suggested Learning Resources

Sr.no	Title of Book	Author	Publication
1	Ethics and Politics of Indian constitution	Rajiv Bhargava	Oxford University –New Delhi- 2008
2	The Constitution Of India	B.L.Fadia	Sahitya Bhawan- 2017 edition
3	Introduction to constitution of Indian	D.D.Basu	Lexis Nexis- 2018 Edition
4	Maharashtra Shasan diary		

Suggested softwares /Learning websites:-

1. <https://www.constitution.org/cons/india/const.html>
2. <https://www.legislative.gov.in/constitution-of-india>
3. <http://www.sci.gov.in/constitution>
4. [http://www.toppr.com/guide/civics/the-indian-constitution/the-constitution of india](http://www.toppr.com/guide/civics/the-indian-constitution/the-constitution-of-india)

Grade to the students should be allotted as follows:-

1. If the student scores marks more than 90 percent – Grade A +
2. If the student scores marks more than 85 percent – Grade A
3. If the student scores marks more than 80 percent – Grade B +
4. If the student scores marks more than 75 percent – Grade B
5. If the student scores marks more than 70 percent – Grade C +
6. If the student scores marks more than 60 percent – Grade C

COURSE ID:

Course Name : PROFESSIONAL PRACTICES
Course Code : IEG 207
Course Abbreviation : GPRP

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	1	3
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Detailsof Evaluation	-	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	No term end theory exam	Term End Practical/ Micro-project Exam (3 hours)	
Marks	-	--	-	75I	75

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

RATIONALE:

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

COMPETENCY:

Apply principles of organizational behavioral science for professional 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:

IEG207-1 - Develop awareness about industrial scenario of world and India

IEG207-2 - Acquire professional skills like leadership, stress and conflict management, team building skills

IEG207-3 - 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Design, implement and maintain 8051 microcontroller based embedded systems	-	-	-	-	2	2	1	-	-
IEIG207-1	-	-	-	-	2	-	1	-	-
IEIG207-2	-	-	-	-	2	2	1	-	1
IEG207-3	1	-	-	-	2	3	1	-	-

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.

CONTENT:

B) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10/20 out of 15/25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Information Search through internet on Industrial Scenario of India	Information search and interpretation skills	IEG207-1
2	Information Search through actual visit to MIDCs on classification of industries	Information search and interpretation skills	IEG207-2
3	Biography and contribution of Sir M. Visverayya and J.R.D.Tata	Information search and presentation skills	IEG207-3

4	Biography and contribution of two eminent industrialists from programme discipline	Information search and presentation skills	IEG207-3
5	Individual SWOT analysis as a professional technician	Self-analysis skills	IEG207-2
6	Leadership	Leadership skills	IEG207-2
7	Stress and Conflict Management	Stress and conflict management skills	IEG207-2
8	Aptitude test	Self-testing skills	IEG207-2
9	Case study of a major technological project in the programme discipline	Case study skills	IEG207-1,2,3
10.	Breathing exercises, pranayam, omkar chanting and meditation	Attaining calmness of mind and balance of emotions	IEG207-2

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- Prepare a video resume of self of atleast 2 to 3 minutes.
- Prapare a list of inspiring movies and write a review on any one of it.
- Read about transformational leadership and write a note on “Shivaji Maharaj as Transformational Leader”
- Arrange an interview with successful entrepreneur and prepare a report of interview session.
- Visit MIDC office and collect information about industries under the office, role and responsibilities of the office staff.
- Visit any social project / NGO and have informal intervies with the Chief of the project. (The discussion shall include the points like team building, stress management, time management, financial aids, public and government support etc)
- Conduct any one activity which will bboost your strengths and help to overcome weaknesses.

C) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)
IEG207-1 - Develop awareness about industrial scenario of world and India.		
1	Industrial Development of India 1.1 Introduction to industrial revolution in the world 1.2 Brief history of industry in India 1.3 Broad categories of industries : Manufacturing industry, service industry 1.4 Present industrial scenario of India : Small scale, medium scale and major industries in the programme discipline 1.5 Major issues related to industrialization	4
IEG207-2 - 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	8
IEG207-3 - Identify major technological project in program discipline.		
3	Industrial Personalities and Major Projects 3.1 Pioneers of Industrial development of India : Brief biography of Sir M. Visvesaraya and JRD Tata 3.2 Biography and contribution of two great industrial personalities from programme discipline 3.3 Study of 5 major technological projects in the programme discipline	4
	Sub-total	24

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

d) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Understand the thought behind the practical assignment. (assessment based on questions)	05
Psychomotor	Writing skills / Diagrams / Photos	05
	Observation / Conclusion / Inference / moral of the assignment	05
Affective	Discipline and punctuality	05
	Procedure/Safety Measures/Decency/Presentation	05
TOTAL		25

ii) Progressive Skill Test:

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

Sr. No.	Criteria	Marks allotted
1	Complete write-up – Content, observations, conclusion	10
2	Oral Based on Test :- Verbal – non verbal communication, presentation, Gestures, General knowledge	15
	Total	25

e) Assessment Criteria for Term-end Practical Examination:

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	Complete write-up – Content, observations, conclusion	10
2	Oral Based on Test :- Verbal – non verbal communication, presentation, Gestures, General knowledge	15
	Total	25

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

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Industrial visits and interview sessions

Teaching and Learning Resources:

1. Chalk board
2. Video clips
3. PPTs
4. Question Bank
5. Charts

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

* * *

LEVEL- III

LIFE SKILLS AND PROFESSIONAL SKILLS COURSES

COURSE ID

Course Name : APPLIED MATHEMATICS
Course Code : EIG301
Course Abbreviation : GAMT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : CCG105, CCG106

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	

Evaluation Scheme :

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

RATIONALE:

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

COMPETENCY:

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

1. Cognitive: understanding and applying principles of mathematics to engineering problems
2. Psychomotor: To prepare charts displaying the area of irregular shapes using the concept of integration, prepare charts to displaying grouped and ungrouped data
3. Attitude: discipline, consistency, hard work , to concentrate ,accuracy,punctuality, aesthetics

COURSE OUTCOMES:

EIG301.1 Apply the concept of integration to find the areas

EIG301.2 Solve Differential equation of first order and first degree by various methods

EIG301.3 Solve examples on Laplace Transform

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

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

	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	PSO1 Plan and Design	PSO2 Construction and Maintenance	PSO3 Decision & solving problem
Competency: to apply the mathematical techniques for	3	2	3	2	-	-	1	2	1	--
EIG301.1	3	2	2	-	-	-	1	2	1	--
EIG301.2	3	2	3	-	-	-	1	1	1	--
EIG301.3	3	2	3	1	2	-	1	3	2	--

CONTENT :

1)THEORY

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG301.1 Apply the concept of integration to find the areas			
1	Indefinite Integrals 1.1 Definition, Standard formulae 1.2 Rules of Integration(without proof), Examples 1.3 Integration by substitution 1.4 Integration by parts 1.5 Integration by partial fractions	12	20

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)
EIG301.1 Apply the concept of integration to find the areas			
EIG301.1 Apply the concept of integration to find the areas			
2	Definite Integrals 2.1 Definition, Examples 2.2 Properties of Definite Integration (without proof), Examples based on properties	06	10
EIG301.1 Apply the concept of integration to find the areas			
3	Application of Integration 3.1 Area under the curve and 3.2 Area between two curves	06	10
Total		24	40
<p>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.</p> <p>2. In each topic, corresponding applications will be explained.</p>			

Section II

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation (Marks)
EIG301.2 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 Homogeneous Equation 4.3.3 Exact equations 4.3.4 Linear Equations	12	20

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG301.2 Solve Differential equation of first order and first degree by various methods			
EIG301.3 Solve examples on Laplace Transform			
5	LAPLACE TRANSFORM 5.1 Definition ,Linearity property 5.2 Laplace Transforms of Standard functions(without proof) and examples 5.3 First shifting property and examples 5.4 Examples on Multiplication by t^n 5.5 Inverse Laplace Transform, Definition 5.6 Standard formulae(without proof) and examples 5.7 Inverse L.T.by using First shifting property 5.8 Inverse L.T. by using Partial fraction method	12	20
	Total	24	40
<p>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.</p> <p>2.In each topic corresponding applications will be explained</p>			

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
		Remem	Comprehens	Applica		
1	Indefinite Integrals	4	6	10	EIG301.1	20
2	Definite Integrals	2	2	10	EIG301.1	14
3	Application of Integration	--	--	06	EIG301.1	06
4	Differential equations	4	4	12	EIG301.2	20
5	Laplace Transformation	6	6	8	EIG301.3	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) 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
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	LaplaceTransformation	Examples on L.T.using standard formulae and first shifting property
9	LaplaceTransformation	Examples on L.T using first shifting property and multiplication by t^n
10	LaplaceTransformation	Examples on inverse L.T.

Instructional Methods:

1. Lectures and Demonstrations
2. Tutorials
3. Online teaching

Teaching and Learning resources:

1. Chalk board
2. Item Bank
3. Charts
4. Computers

REFERENCE MATERIAL :

a) Books:

Sr. No.	Author	Title	Publisher
1	G.V. Kumbhojkar	Engineering Mathematics III	Phadake Prakashan, Kolhapur
2	Patel, Rawal,	Applied Mathematics	Nirali Prakashan, Pune

3	Sameer Shah	Applied Mathematics	Tech-Max Publication, Pune
4	P.N.Wartikar	Applied mathematics	Pune vidyarthi Griha Prakashan , pune
5	H.K.Dass	Higher engineering mathematics	S .Chand publication
6	B.S.Grewal	Higher engineering Mathematics	Khanna publication, New Delhi

b) Website

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

COURSE ID:

Course Name : APPLIED ELECTRONICS
Course Code : EIG 302
Course Abbreviation : GATX

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIG103

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	07
Practical	04	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical */ Micro-project	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical and Micro-project Exam (3 hours)	
Marks	20	--	80	75E	175

* E-External Assessment *Assessment at semester end practical exam as per Pro-forma III.

RATIONALE:

Knowledge of Electronic components & devices is quite essential for a student of electronic engineering diploma programme while maintaining electronics equipments. 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.

Cognitive: Understand applications of electronic circuits.

Psychomotor: .Build circuits as per application

Affective: Attitude of i) Logic ii) accuracy

COURSE OUTCOMES :

EIG302-1. Select type of feedback amplifier as per requirement in industry

EIG103-2 Examine and operate rectifier and filter.

EIG302-3 Assemble different wave shaping circuits and change input waveform shape as per requirement

EIG302-4.Analyze various power amplifiers and choose particular power amplifier as per requirement

EIG302-5 Analyze transistor behavior as a switch and use it's switching property in multivibrator applications

EIG302-6 Use sweep generators in electronics 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency : Apply and build simple electronics circuits •	3	-	-	2	2	1	3	3	2
EIG302-1.	2	-	-	1	-	-	2	1	1
EIG103-2	3	-	-	2	2	2	3	3	2
EIG302-3	3	-	-	2	-	1	2	2	2
EIG302-4.	3	-	-	2	2	2	1	1	1
EIG302-5	3	-	-	1	-	2	2	1	1
EIG302-6	3	-	-	2	2	1	3	2	2

CONTENT:

A) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any '20' experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Tuned circuit oscillator	1) Calculate the oscillator frequency 2) Verify calculated frequency with actual observed frequency	EIG 302-2
2.	Hartley Oscillator	1) Calculate the oscillator frequency 2) Verify calculated frequency with actual observed frequency	EIG 302-2

3.	Colpitts Oscillator	1) Calculate the oscillator frequency 2) Verify calculated frequency with actual observed frequency	EIG 302-2
4.	RC phase shift Oscillator	1) Calculate the oscillator frequency 2) Verify calculated frequency with actual observed frequency	EIG 302-2
5.	RC differentiator circuit	a) Build RC circuit as an differentiator b) Check applications of differentiator as waveshaping circuit(response of the circuit for square and triangular input)	EIG 302-3
6.	RC Integrator Circuit	a) Build RC circuit as an integrator b) Check applications of integrator as waveshaping circuit(response of the circuit for square input)	EIG 302-3
7.	Positive Clipping circuit waveform observation.	1) Build diode clipper circuit 2) Observe Clipping waveform on CRO	EIG 302-3
8.	Negative Clipping circuit waveform observation.	1) Build diode clipper circuit 2) Observe Clipping waveform on CRO	EIG 302-3
9.	Combination Clipper	1) Build diode combination clipper circuit 2) Observe Clipping waveform on CRO by changing clipping levels	EIG 302-3
10.	Positive Clamping circuit :waveform observation	1) Build diode clamper circuit 2) Observe Clamping waveform on CRO	EIG 302-3
11.	Negative Clamping circuit :waveform observation	1) Build diode clamper circuit 2) Observe Clamping waveform on CRO	EIG 302-3
12.	Voltage doubler	1) Build and verify how the output voltage gets doubled the input voltage using voltage doubler.	EIG 302-3
13.	Class A power amplifier with resistive load	1) Build class A power amplifier with resistive load 2) Check output of circuit	EIG302-4
14.	Complementary symmetry class B Power amplifier	1) Build class B power amplifier in complementary symmetry configuration 2) Check output of circuit	EIG302-4
15.	Single tuned Voltage amplifier	1) Build single tuned voltage amplifier 2) check output response and draw on semilog graph paper	EIG302-4

16.	Astable multivibrator using transistor : time measurement and calculations.	1) To generate square wave form on CRO using transistor astable multivibrator 2) To measure time period on CRO and verify it by using calculation formula	EIG 302-5
17.	Monostable multivibrator using transistor : time measurement and calculations	1)To check output of transistor monostable multivibrator 2)TO measure time period on CRO and verify it by using calculation formula	EIG 302-5
18.	Bistable multivibrator using transistor	1)To check output of transistor Bistable multivibrator	EIG 302-5
19.	Schmitt trigger using transistor	1) To check how the input waveform is converted in to the square wave using Schmitt trigger	EIG 302-5
20.	Exponential switch sweep circuit	1) Build Exponential switch sweep circuit 2)Check output and draw it on graph	EIG 302-6
21.	Transistor switch sweep circuit	1) Build Transistor switch sweep circuit 2)Check output and draw it on graph	EIG 302-6
22.	Miller sweep generator	1) Build Miller sweep circuit 2)Check output and draw it on graph	EIG 302-6
23.	Clamping circuit using simulation software	1)Build Clamping circuit using relevant software 2)Check output response	EIG 302-3
24.	Multivibrator circuit using simulation software	1)Build any Multivibrator circuit using relevant software 2)Check output response	EIG 302-5
25.	Clipper circuit using simulation software	1)Build any clipper circuit using relevant software 2)Check output response	EIG 302-3

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 2nd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- a) Construct a door bell using transistor
- b) Using transistor ,construct a clap switch
- c) Simple Water Level Indicator.
- d) Automatic LED Emergency Light.
- e) Infrared Motion detector.
- f) Multivibrator based alarm system
- g) Fire Alarm Project.

- h) Lead-acid battery charger.
- i) FM transmitter using transistor
- j) Clap operated remote control for fans
- k) Battery Charger using solar light
- l) Automatic street light control

B.THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lecture s (Hours)	Theory Evaluation n (Marks)
<i>EIG302-1. Select type of feedback amplifier as per requirement in industry</i>			
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, comparison) 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.	08	12
<i>EIG103-2 Examine and operate rectifier and filter.</i>			
2.	Sinusoidal Oscillators 2.1 Positive feedback in oscillators 2.2 Barkhausen's Criteria 2.3 Circuit 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	08	14
<i>EIG302-3 Assemble different wave shaping circuits and change input waveform shape as per requirement</i>			
3	Wave shaping Circuits Circuit diagram, waveforms and operation of following:- 3.1 Linear wave shaping circuits.	08	14

	3.1.1 Differentiator - High pass R--C circuits -Response to triangular input & square wave 3.1.2 Integrator-- Low pass RC circuit – Response to square input & rectangular input 3.2 Nonlinear wave shaping 3.2.1 Clippers 3.2.1.1 Positive clipper 3.2.1.2 Negative clipper 3.2.1.3 Combinational clipper 3.2.2 Clampers 3.2.2.1 Positive clampers 3.2.2.2 Negative clampers 3.2.2.3 Voltage doublers and triplers.		
	Sub Total	24	40

Section-II

Sr. No.	Topics	Teaching hours	Marks
<i>EIG302-4. Analyze various power amplifiers and choose particular power amplifier as per requirement</i>			
4.	Power and Tuned Amplifier 4.1 Classification of Power Amplifier 4.2 Circuit Diagram, Working, Characteristics, Efficiency of following: 4.2.1 Class A Power Amplifier - Transformer coupled P A. 4.2.2 Class B Power Amplifier and Crossover distortion 4.2.3 Class B Push pull amplifier 4.2.4 Complementary symmetry Class B Push Pull amplifier 4.3. Class C amplifier (only introduction) 4.4 Tuned Amplifiers 4.4.1 Series and parallel connections of tank circuit 4.4.2 Frequency response of tuned amplifier 4.4.3 Single tuned amplifier 4.4.4 Double tuned amplifier	08	16
<i>EIG302-5 Analyze transistor behavior as a switch and use it's switching property in multivibrator applications</i>			

5	BJT Switching Circuits 5.1 Transistor as a switch, Transistor Switching Times 5.2 Transistorized Multivibrators and its types:- Circuit Diagram, Operation, timing equations & applications of following:- 5.2.1 Astable multivibrator 5.2.2 Monostable multivibrator 5.2.3 Bistable Multivibrator 5.2.4 Schmitt Trigger 5.3 Numericals based on timing equations of above circuits	08	12
<i>EIG302-6 Use sweep generators in electronics circuits</i>			
6.	Sweep Generators 6.1 Introduction to sweep waveform 6.2 Method of generating Voltage timebase waveform- Circuit Diagram, Operation of following 6.2.1 Exponential sweep circuit 6.2.2 Transistor switch sweep generator 6.2.3 UJT switch sweep generator 6.2.4 Miller sweep generator 6.2.5 Bootstrap sweep generator 6.3 Current sweep generator -Transistorized constant current sweep generator circuit diagram and operation	08	12
	Sub Total	24	40
	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 (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
1	Feedback Amplifier	02	04	06	EIG103-1	12
2	Sinusoidal Oscillator	02	04	08	EIG103-2	14
3	Waveshaping Circuits	02	06	06	EIG103-3	14
4	Power and Tuned Amplifier	04	06	06	EIG103-4	16
5	BJT Switching Circuits	02	04	06	EIG103-5	12
6	Sweep Generators	02	04	06	EIG103-6	12
	Total >>	14	28	38		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

f) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/ Algorithm/ flowchart	05
	Observation/ Logic/ Program/ Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	05
TOTAL		25

ii) Progressive Skill Test:

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

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

g) Assessment Criteria for Term-end Practical Examination:

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	Technical ability	10
2	Correct figures / diagrams/ Logic	10

3	Observation table/ Algorithm/ flowchart/ Program	10
4	Correctness of - Result / Output / Calculations / Graphs	10
5	Safety / Use of proper tools / overall Decency & Presentation / Workmanship	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

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

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3. PPT 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	V. K. Mehta	Principles of Electronics	S.Chand
2.	B. L. Theraja	Basic Electronics	S.Chand
3.	R.S.Sedha	A text book of Applied Electronics	S.Chand
4.	G. K. Mithal	Applied Electronics	Khanna Publication
5.	A. Motershed	Electronics Devices & Circuits	PHI Publication
6.	Malvino	Electronics Principles	McGraw Hill
7.	Bell, Devid	Fundamental of Electronics Devices and circuits	Oxford University

h) Websites

- 1) www.nptel.iitm.ac.in
- 2) www.learningaboutelectronics.com
- 3) www.electronics-tutorials.com
- 4) <https://circuitdigest.com/electronic-circuits>
- 5) https://www.tutorialspoint.com/basic_electronics/basic_electronics_transistors.htm
- 6) https://www.youtube.com/watch?v=O_pqCNPs6xw
- 7) <https://www.youtube.com/watch?v=0nXEUKFBd8A>

COURSE ID:

Course Name : Electronics Measurements and Instruments
Course Code : EIG303
Course Abbreviation : GEMI

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	50I	150

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

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 and transducers 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:

EIG303-1 Describe various characteristics of measuring instruments.

EIG303-2 Identify unknown values of components using bridges for industrial applications.

EIG303-3 Describe & suggest suitable digital instruments and transducers for measurement of various electronic parameters.

EIG303-4 Explain and demonstrate the uses of CRO.

EIG303-5 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Illustrate practical information & technical background for different engineering applications.	2	3	2	1	-	-	1	2	3
EIG303-1	2	2	2	-	-	-	1	2	2
EIG303-2	1	2	2	-	-	-	-	2	2
EIG303-3	-	3	2	1	-	-	-	2	2
EIG303-4	1	2	3	1	-	-	1	3	2
EIG303-5	1	2	2	-	-	-	-	2	2

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.

CONTENT:

A) SUGGESTED PRACTICALS/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10/20 out of 15/25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	Use of analog and digital multimeter. 1)Measurement of voltage 2)Measurement of current 3)Measurement of resistance 4)Checking for continuity	1. Connect power supply 2. Check voltage, current, & resistance using multimeter.	EIG303, 3
2.	Use of LCR--Q meter 1) measurement of different values of inductors 2) Capacitors 3) resistors	1. start LCR-Q meter in idle mode 2. measure resistor, inductor, & capacitor at different ranges	EIG303-3
3.	Use of CRO as component tester. 1) Checking different components such as resistor, diode, capacitor etc. 2) Observation of patterns.	1. Connect CRO & adjust intensity and focus 2. Test different components like diode, transistor etc. 3. Know front panel of CRO	EIG303-4
4.	Identify various types of transducers 1)Categorize transducers(such as pressure ,temp etc.) 2)Identify particular type(e.g.PT-100)	1. Identifying particular type of transducer. 2. Finding sub type of the given transducer.	EIG303-3
5.	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	EIG303-4
6.	Test performance of inductive transducer LVDT.	1)Implement the setup needed. 2)Checking and comparing voltages for the performance of LVDT.	EIG303-3
7.	Use of CRO for measurement of phase & frequency using Lissajous figures	e phase difference & frequency ratio using Lissajous figure	EIG303-4
8.	Use of function generator	1. connect function generator 2. Know front panel of function generator	EIG303-5

		3. Check different output functions using CRO	
9.	Use of detectors for Ac bridge like headphone	1. Connect circuit of AC bridge as per diagram 2. Detect the balancing condition	EIG303-2
10.	Study of whetstone's bridge for measurement of unknown resistances.	1. Connect circuit of Wheatstone bridge as per diagram 2. Detect balancing condition 3. Find out unknown resistance	EIG303-2
11.	Measurement of unknown capacitance using bridge.	1. Connect circuit of AC bridge as per diagram 2. Detect balancing condition 3. Find out unknown capacitance	EIG303-2
12.	Measurement of unknown inductance using bridge.	1. Connect circuit of AC bridge as per diagram 2. Detect balancing condition 3. Find out unknown inductance.	EIG303-2
13.	Use of frequency meter	1. Connect frequency meter 2. Know front panel of frequency meter 3. Measure different freq of sign.	EIG 303-3
14.	Use of any type of temperature transducer.	1. Select appropriate transducer. 2. Measure parameters necessary ..	EIG303-3
15.	Demonstrate any one type of Recorder(Use lab setup/video/visit)	1. Observe the operation of available type of recorder.	EIG303-6

		2. Note the parameters which affects its operation.	
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A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs.

Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- Battery charger circuit
 - Low cost fire alarm circuit
 - Oscillator
 - Schmitt trigger
 - Opamp as adder, sub etc.
 - BCD to seven segment display
- Many more.....

B) THEORY :

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
EIG303-1 Describe various characteristics of measuring instruments.			
1	Basics of Measurement <ol style="list-style-type: none"> 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: 1.7 International, Primary, Secondary. 1.8 Calibration: Definition, Need of calibration 	06	08
EIG303-2 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. 2.5 Capacitance comparison bridge 2.6 Inductance comparison bridge 2.7 Maxwell's bridge. 2.8 Hay bridge 2.9 Schering's bridge 2.10 Wien's bridge.	09	16
EIG-303-3 Describe & suggest suitable digital instruments and transducers for measurement of various electronic parameters.			
3	Digital meters and introduction to transducers. 3.1 Concepts 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 of torque. 3.5 Resolution, Sensitivity and Accuracy of digital display. 3.6 Digital Voltmeter-, Successive approximation type , Digital frequency meter, LCR, Q meter- Block diagram and operation only, 3.7 Transducers: Definition, classification: Active, Passive, Primary, Secondary, Analog, Digital 3.8 Selection criteria for transducer 3.9 Classification: Active, Passive, Primary, Secondary, Mechanical, Electronic, Analog, Digital, Resistive, Capacitive, Inductive Transducers. 3.10 Construction, Operation, Applications : LVDT, RTD,	09	16
4	EIG303-4 Explain & demonstrate the use of CRO.		
	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,	12	20

	<p>Time base generator, Main Horizontal amplifier.</p> <p>4.1.4 CRO Probes- General block diagram of CRO probe, passive voltage probe, and their compensation, Active Voltage probes, current probes.</p> <p>4.1.5 Calibration circuits.</p> <p>4.2 CRO-Block diagram of single beam dual trace and dual beam oscilloscope.</p> <p>4.3 Block diagram of Digital storage oscilloscope.</p> <p>Uses of CRO- Frequency and phase measurement, Tracing of diode and transistor characteristics</p>		
5	EIF303-5 Explain & demonstrate various test & recording instruments		
	<p>Signal Generator and Analyzer</p> <p>5.1 Concept of oscillator.</p> <p>5.2 Signal generator-AF and RF type- Block diagram and Operation only.</p> <p>5.3 Function generator and pulse generator- Block diagram, Simple controls and operation only.</p> <p>5.4 Specification.</p> <p>5.5 Concept of time domain and frequency domain Instruments.</p> <p>5.6 Spectrum & Logic analyzer- Block diagram and Operation only.</p>	08	12
	EIG 303-5 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
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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	EIG303-1	08
2	AC/DC bridges & applications	04	04	08	EIG303-2	16
3	Digital Meters and introduction to transducers.	04	04	08	EIG303-3	16
4	Oscilloscope	06	06	08	EIG303-4	20
5	Signal Generators Analyzers	02	08	02	EIG303-5	12
6	Recorders	02	04	02	EIG303-5	08
	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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma 4.*

b) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

**Assessment at semester end practical exam as per Proforma 4*

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3. PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

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. <http://circuiteasy.com>
2. www.expresspcb.com/expresspcbhtm/download.htm
3. www.freepcb.com
4. <http://www.circuitstoday.com/simple-electronics-projects-and-circuits>
5. <http://www.buildcircuit.com/5-beginners-projects-that-work-in-the-first-attempt>
6. www.tatamcgrawhill.com

* * *

COURSE ID :

Course Name : C Programming

Course Code : EIG304

Course Abbreviation : GCPR

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme :

Scheme component	Hours / week	Credits
Theory	2	6
Practical	4	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	--	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	--	Term End Practical/ Micro-project Exam	100
Marks	--	--	--	100E	

* E- External Assessment *Assessment at semester end practical exam as per Pro-forma III.

RATIONALE :

This course is designed to develop programming attitude and attract the interest of the students in the C Language. C is a very powerful, widely used, efficient and compact, which combines features of high-level language and low-level language. It is used in many scientific programming situations. It forms the core of the modern languages Java and C++. Almost every set up in software Engineering domain chooses C as a first priority programming language.

COMPETENCY

Develop programming skills of C Programming to solve engineering problems in procedural way.

Cognitive : Understanding and implementing concepts of procedural programming

Psychomotor : i) Operating Computer system efficiently

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

COURSE OUTCOMES :

EIG304-1 Identify C expressions with character set and operators.

EIG304-2 Apply decision making and branching and looping constructs in programming.

EIG304-3 Implement user defined functions and arrays.

EIG304-4 Implement library functions for string handling.

EIG304-5 Develop C programs using structures and pointers.

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

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

Competency and COs	PO								PSO1 Design and development	PSO2 Database and Network management
	PO 1 Basic and discipline specific knowledge	PO 2 Problem analyses	PO 3 design/ development of solutions	PO 4 Engineering Tools, experimentation and testing	PO 5 Engineering practice for society, sustainability and environment	PO 6 Project management	PO 7 Life-long learning			
Competency: Apply concepts of C Programming to solve engineering problems	3	3	3	2	2	2	1	3	-	
EIG304-1	2	1	2	2	2	1	1	-	-	
EIG304-2	2	3	3	3	2	1	1	2	-	
EIG304-3	2	2	3	3	1	1	1	2	-	
EIG304-4	2	2	3	3	1	1	1	2	-	
EIG304-5	2	2	2	3	2	1	1	2	-	

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.

CONTENT:

B) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency. (any 10/20 out of 15/25 experiments)

Sr. No.	Title of Experiment	Skills to be developed	Course Outcome
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01	Study of Flowcharts and Algorithm	<ul style="list-style-type: none"> • Understanding an Algorithm • Understanding the Flowchart • Study of various Flowchart Symbols • To draw Flowchart on any Practical routine 	EIG304-1
02	Character set and Operators, Valid and invalid identifiers, variables and constants	<ul style="list-style-type: none"> • study of character set of C language • Various types of operator and their use • identifier, variables, constant, Keyword • Rules for valid variables, identifiers, constants. • Identify valid and invalid variables, keywords, identifiers, constants 	EIG304-1
03	C.Expressions	<ul style="list-style-type: none"> • Simple programming structure and Standard Header file • Understanding expression • Conversion of mathematical Expression in .C. • Identify valid and invalid C expressions. • Use of library functions 	EIG304-1
04	Implementation of Basic Operators	<ul style="list-style-type: none"> • C programs on arithmetic operators • C programs using assignment operator • C programs with Unary operators 	EIG304-1
05	Implementation of Operators	<ul style="list-style-type: none"> • C programs on Relational & Logical Operators, C • C programs on Conditional & Comma Operator 	EIG304-1
06	Input and output Functions	<ul style="list-style-type: none"> • Standard Input function- scanf() • Standard Output function-printf() • Syntax and use of scanf() and printf() function with example 	EIG304-1
07	Character and String Input and output Functions	<ul style="list-style-type: none"> • Using character input and output functions getchar() ,putchar() • Using string input and output functions gets(), puts() 	EIG304-1
08	Decision Making and branching using if, if-else structure (i) Determine whether a given year is a leap year or not.	<ul style="list-style-type: none"> • necessity of control structure • If statement - syntax and flowchart • If-else statement - syntax and flowchart 	EIG304-2
09	Decision Making and branching using Nested if, ladder if-else structure Write program to: i) Determine whether a string is palindrome.	<ul style="list-style-type: none"> • Nested if..else - syntax and flowchart • Else..if ladder - syntax and flowchart 	EIG304-2

10	Implementation of Switch statement Write programs to : (i) Print day of week by taking number from 1 to 7 . Print a student's grade by accepting percent marks.	<ul style="list-style-type: none"> • use of switch statement • Syntax and flowchart of switch statement. • significance of break statement in switch case • use of default statement in switch case • Program using switch statement 	EIG304-2
11	Implementation of Conditional and unconditional branching	<ul style="list-style-type: none"> • conditional and unconditional branching • syntax and use of go to statement • use of forward and backward jumping • break statement • continue statement • Program based on goto, continue and break statement 	EIG304-2
12	Implementation of for Statement- Write a program to (i) Find sum of digits of a given number. (ii)Generate multiplication table up to 10 for numbers 1 to 5.	<ul style="list-style-type: none"> • definition of loop • syntax and flowchart of for loop • execution of for loop • nested for loop • Program based on for loop 	EIG304-2
13	Write a program to find Fibonacci series for given number.	<ul style="list-style-type: none"> • Exit control and Entry control loop • syntax and flowchart of while loop • execution of while loop • program based on while loop 	EIG304-2
14	: Write a program to produce the following output: <pre> 1 2 3 4 5 6 7 8 9 10 </pre>	<ul style="list-style-type: none"> • execution of while loop • program based on while loop 	EIG304-2
15	Program based on While loop	<ul style="list-style-type: none"> • Exit control and Entry control loop • syntax and flowchart of while loop • execution of while loop • program based on while loop • Exit control and Entry control loop 	EIG304-2
16	Program based on Do while loop	<ul style="list-style-type: none"> • syntax and flowchart of do_ while loop • execution of do_ while loop <p>program based on do_ while loop</p>	EIG304-2
17	Program based on nested loop	<ul style="list-style-type: none"> • C program implementation on nested loop. 	EIG304-2
18	Implementation of an array	<ul style="list-style-type: none"> • Understanding and use of an array 	EIG304-3

	<ul style="list-style-type: none"> Develop a Program to: Sort list of 10 numbers. 	<ul style="list-style-type: none"> syntax to declare and initialize an array read and print the elements of an array access a particular element of an array programs based on arrays 	
19	<p>Study of two dimensional array</p> <p>Write a program for—</p> <p>(i) storing elements in a matrix and printing it</p> <p>(ii) Write a program for printing sum of two matrices</p>	<ul style="list-style-type: none"> Understanding and use of two dimensional array Syntax to declare and initialize a 2-D array read and print the elements of 2-D array access a particular element of 2-D array Program based on 2-D array 	EIG304-3
20	<p>Program based on function</p> <p>Write a program to-</p> <p>(i) To check whether a number is prime or not</p>	<ul style="list-style-type: none"> Understanding function function declaration or prototype syntax to define a function function call function parameters function return value Program using functions 	EIG304-3
21	<p>Program on recursion</p> <p>i) Find factorial of number using recursion</p>	<ul style="list-style-type: none"> Implement C program using recursion. 	EIG304-3
22	<p>Strings and string manipulation functions</p> <p>i) Program to find string length</p> <p>ii) Program to reverse string</p>	<ul style="list-style-type: none"> Understanding string declaration and initialization of string reading and printing a string from and to terminal. String- handling Functions - strlen(), strrev() Programs on strings and string handling functions 	EIG304-4
23	Implementation of string functions	<ul style="list-style-type: none"> Programs on strings and string handling functions <p>strcmp(), strcpy(), strcat(),strupr(),strlwr(),</p>	EIG304-4
24	Study of Structure Create a structure	<ul style="list-style-type: none"> Understanding and syntax of 	

	called library to hold details of a book viz. accession number, title of the book, author name, price of the book, and flag indicating whether book is issued or not. Fetch some sample data and display the same.	structure <ul style="list-style-type: none">• size of structure• declaration and initialization of structure• declaring a structure variable• accessing members of structure• array as a member of structure• Program based on structure and arrays in structure	EIG304-5
25	Implementation of Pointer	<ul style="list-style-type: none">• Understanding pointer• basic difference between variable and pointer• declaration of pointer• Initializing pointer variable• program to access address of variable	EIG304-5

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of micro projects is as follows:

- a) Prepare sample mark sheets for 20 students.
- b) Generate salary slips of employee in an organization.
- c) Prepare book issue system of library.
- d) Any other similar kind of micro project suggested by Course teacher

CONTENT:

D. THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)
Course Outcome EIG304 – 1 Identify C expressions with character set and operators.		
1	C FUNDAMENTALS 1.1History of c 1.2 C character set 1.3 Identifiers & Keywords, 1.4 Data types 1.5 Variables 1.6 Declarations 1.7 Constants 1.8 Expressions 1.9 C Instructions 1.10 The first C program 1.11 Compilation & Execution	05
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 Input and Output Library Functions 2.2.1 printf() 2.2.2 scanf() 2.2.3 getchar() 2.2.4 putchar() 2.2.5 gets() 2.2.6 puts()	05
Course Outcome EIG304 -2 Apply decision making and branching and looping constructs in programming.		
3	CONTROL STATEMENTS 3.1 Decision making and branching 3.1.1 if Statement(if, if-else, if-else ladder, nested if-else)	06

	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	

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)
Course Outcome EIG304 -3 Implement user defined functions and arrays.		
4.	ARRAYS & FUNCTIONS 4.1 Defining an array, 4.2 One dimensional array ,Declaration and Initialization of Arrays, 4.3 Two Dimensional Arrays Declaration and Initialization of Arrays, 4.4 Defining a Function, Accessing a function, 4.5 Passing arguments to a Function(call by value and call by reference), Specifying argument data types 4.6 Scope and lifetime of variables 4.7 Function prototypes 4.8 Recursion	06
Course Outcome EIG304 -4 Implement library functions for string handling.		
5.	CHARACTERS & STRINGS 5.1 The char data type, using character variables, using string 5.2 Declaring and initializing string variables 5.3 Reading strings from terminal 5.4 Writing Strings to screen, putting strings together. 5.5 Comparison of two strings 5.6 String- handling Functions - strcmp(), strlen(), strcpy(), strcat(), strupr(), strlwr(), strrev()	05
Course Outcome EIG304 -5 Develop C programs using structures and pointers.		
6.	Structures and Pointers 6.1 Simple structures (Defining & declaring structures, accessing structure members) 6.2 Complex structures (structures that contain arrays) 6.3 Understanding pointers, declaring pointer variable, initialization of	5

	pointer variable, accessing address of a variable	
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ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

i) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma X.*

j) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk and Board
2. Video Clips
3. PPTs
4. Question Bank
5. Charts

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	E.Balgurusamy	Programming in ANSI C	Tata McGraw Hill Education
2.	Yashwant Kanetkar	Let us C	BPB Publication
3	Bryon Gottfried	Programming with C	Schaum's Outlines Series
4	kerninghan& Ritchie	The C Programming language	Prentice Hall

b) Websites

- ✓ <https://www.w3schools.in/c-tutorial/>
- ✓ www.cprogramming.com
- ✓ www.learn-c.org
- ✓ www.tutorialspoint.com/cprogramming
- ✓ [https://www.tutorialspoint.com/compile_c_online.php](http://www.tutorialspoint.com/compile_c_online.php)

COURSE ID:

Course Name : ANALOG COMMUNICATION
Course Code : EIG305
Course Abbreviation : GACM

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : --

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	50I	150

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

RATIONALE:

Analog Communication is the subject that presents information about the basic processes, circuits and other building blocks of communication system. The study of basic operating and handling of various analog communication system will help them to troubleshoot and maintain analog communication systems used for various types of communication.

COMPETENCY:

Explain, operate and maintain different Analog communication systems.

Cognitive: Describe the fundamentals of different electronics communication systems.

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:

EIG305-1 Use relevant frequency ranges for different communication systems.

EIG305-2 Use relevant modulation techniques for specific applications.

EIG305-3 Maintain transmitter circuit of AM and FM.

EIG305-4 Maintain receiver circuit of AM and FM.

EIG305-5 Use relevant media for transmission and reception of signals.

EIG305-6 Use relevant type Antenna 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Explain, operate and maintain different Analog communication systems.	2	1	2	1	-	-	-	1	1
EIG305-1	1	-	-	-	-	-	-	-	-
EIG305-2	2	-	2	-	-	-	-	-	1
EIG305-3	2	-	1	1	-	-	-	-	1
EIG305-4	1	2	2	-	-	-	-	1	1
EIG305-5	-	1	-	-	-	-	-	-	-
EIG305-6	-	1	-	-	-	-	-	-	-

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.

CONTENT:

C) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10/12 out of 15 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Generate Amplitude modulation Wave	Trace the circuit identify carrier, Modulating signal and modulated signal.	EIF305-2

2	Observation & measurements of AM wave	Observe AM waveform on CRO. Calculate modulating index	EIF305-2
3	Study trapezoidal pattern	Observe various trapezoidal patterns on CRO. Calculate modulating index using this pattern	EIF305-2, 3
4	Demodulation of FM using Diode detector	Trace the circuit , Identify Modulated and demodulated signal and observe waveforms on CRO	EIF-2,4
5	Generation of Frequency modulated waveform	Trace the circuit , Identify carrier , modulating signal and modulated signal	EIF305-2, 3
6	Observation and measurement of FM wave	Observe FM waveforms on CRO Calculate modulating index	EIF-2,3
7	Demodulation of FM signal	Observe FM and FM demodulated waveforms on CRO. Observe similarities in modulated signal and demodulated signal.	EIF305-2,4
8	Visit to AM Transmitter	Understand AM transmitter and prepare a project report	EIF305-1-3
9	Visit to FM Transmitter	Understand FM transmitter and prepare a project report	EIF305-1-3
10	Study of super heterodyne radio receiver	Identify different blocks & expected waveforms of superheterodyne radio receiver, Identify different controls and their functions and measure the voltages at different check points.	EIF305-1-4
11	Fault finding in Super heterodyne receiver	Locate faults using voltage and waveform technique at different check points and correct them .	EIF305-1-4
12	To plot selectivity and fidelity curve for superheterodyne 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.	EIF305-4,5
13	Study of FM Receiver	Identify different blocks & expected waveforms of slope or ratio detector. Identify different controls and their functions and measure the voltages at different check points	EIF305-4,5
14	Study and design Of Yagi-Uda Antenna	Draw diagram of yagi_uda antenna. Identify and describe parts of yagi_uda antenna.	EIF305-5,6
15	Study and design of Parabolic reflector (Dish Antenna)	Draw diagram of Dish antenna. Identify and describe parts of Dish antenna for particular λ .	EIF305-5,6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- a) **Modulation:** Built a circuit for modulation using IC MC1496/8038 on general purpose PCB and prepare the report.
- b) **FM Transmitter:** Built a circuit on general purpose PCB for FM transmitter using IC 8038 / transmitter BF549 and prepare the report.
- c) **Antenna:** simulate a microstrip patch antenna for frequency 2.4GHz frequency using HFSS (high frequency structure simulator) software.
- d) **Tuning of IFT:** Build a circuit on general purpose PCB for tuning IFT at 455KHz.

D) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG305-1 Use relevant frequency ranges for different communication systems.			
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, numerical based on noise figure and noise Temperature. 1.4 Electromagnetic Frequency spectrum 1.5 Bandwidth and Information Capacity 1.6 Modulation and Demodulation	6	10
EIG305-2 Use relevant modulation techniques for specific applications			
2	Amplitude Modulation And SSB Techniques. 2.1 Amplitude modulation theory. 2.2 Sidebands, Frequency domain representation and	10	16

	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.		
EIG305-3 Maintain transmitter circuit of AM and FM.			
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
	Sub-total	24	40

Section II

Sr. No.	Topics	Teaching hours	Marks
EIG305-4 Maintain receiver circuit of AM and FM.			
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	10	18

	detector (Basic working of PLL to be covered) 4.2.2 Pre-emphasis and De-emphasis		
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EIG305-5 Use relevant media for transmission and reception of signals

5	Antennas 5.1 Radiation Mechanism. 5.2 Radiation pattern 5.3 Antenna gain, resistance, polarization, beam width, bandwidth 5.4 Resonant and non-resonant antennas. 5.5 Half wave dipole 5.6 Loop antenna. 5.7 Helical antenna. 5.8 Yagi-Uda antenna. 5.9 Parabolic reflector antenna	06	10
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EIG305-6 Use relevant type Antenna for various applications.

6.	Electromagnetic Wave Propagation 6.1 Electromagnetic waves and polarization 6.2 Reflection, refraction, diffraction of waves 6.3 Ground (surface) waves propagation. 6.4 Space 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
	Sub total	24	40
	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 (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 >>	26	42	12		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

k) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma X.*

1) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3. PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS 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	TMH Publication

		Systems	
4	Roddy Coolen	Electronic Communication	PHI Publication

b) Websites

- i. www.nptel.ac.in
- ii. www.antenna-theory.com
- iii. www.explainthatstuff.com/antennas.html
- iv. www.circuitstoday.com/single-chip-fm-radio-circuit

COURSE ID:

Course Name : Digital Techniques & Applications
Course Code : IEG306
Course Abbreviation : GDTA

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	7
Practical	4	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical */ Micro-project	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	75E	150

* E-External Assessment *Assessment at semester end practical exam as per Pro-forma III.

RATIONALE:

In the present scenario most of the electronic equipment like computers, mobiles, music systems, ATM, automation and control circuits and systems are based on digital circuits which the diploma electronic engineering passouts (also called technologists) have to test & troubleshoot these systems. This requires knowledge of basic logic gates, combinational and sequential logic circuits using discrete gates, ADC, DAC as well as digital ICs which will enable the students to interpret the working of digital equipment and maintain them. After completion of the course, students will be able to develop digital circuits based applications.

COMPETENCY:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- I) Build/ test digital logic circuits consisting of digital ICs.

Cognitive: Understand Logic gates and Digital circuits.

Psychomotor: Build digital circuits on Breadboard & observe the output.

Affective: Attitude of i) Logical thinking ability ii) Digital circuit design skills.

COURSE OUTCOMES (COs) :-

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- IEG306-1:** Use number system and codes for interpreting working of digital system.
- IEG306-2:** Use Boolean expressions to realize logic circuits.
- IEG306-3:** Analyze different Logic families & working of basic logic gates.
- IEG306-4:** Build simple combinational circuits.
- IEG306-5:** Build simple sequential circuits.
- IEG 306-6:** Test data converters in digital electronics systems & identify memory types.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Design, implement and maintain Digital Logic circuits or systems	2	3	3	-	-	-	1	3	3
IEG306-1	2	3	1	-	-	-	1	1	-
IEG306-2	2	3	3	-	-	-	1	3	2
IEG306-3	2	2	2	-	-	-	1	3	3
IEG306-4	2	3	3	1	-	-	1	3	3
IEG306-5	2	3	3	1	-	-	1	3	3
IEG306-6	2	3	3	1	-	-	1	3	3

PSO 1: Operate and Maintain: Competency to apply the concepts of Digital 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 Electronics engineering industry.

CONTENT:

E) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any '10' experiments).

Sr No.	Title of Practical Exercise/ Outcomes(PrOs)	Skills / Competencies to be Developed	Course Outcome
1	Test the functionality of NOT,AND,OR & Ex-OR logic gates using breadboard. (IC 7404,7408,7432,7486)	1) Identification of IC's. 2) Testing of logic gates.	IEG 306-2
2	Test the functionality of NAND & NOR logic gates using breadboard. (IC 7400 & 7402)	1) Identification of IC's. 2) Testing of logic gates.	IEG 306-2
3	Construct AND, OR & NOT gates using Universal gates NAND & NOR	1) Building circuit on breadboard. 2) Verifying the output with truth table of each gate.	IEG 306-2
4	Build the logic circuit on breadboard to check the De Morgan's theorems for 2 input variables.	1) Building circuit on breadboard. 2) Verifying the output with truth table of each gate.	IEG 306-2
5	Design Half adder & Full adder using Boolean expressions	----- ' ' -----	IEG 306-3
6	Design Half subtractor & Full subtractor	----- ' ' -----	IEG 306-3
7	Build 8-bit Binary adder using Binary adder IC 7483.	----- ' ' -----	
8	Construct & test BCD to 7-segment decoder using IC 7447/7448	----- ' ' -----	IEG 306-3
9	Build 4:1 Mux using AND-OR gates.	----- ' ' -----	
10	Build 1:4 DMux using NAND gates.	----- ' ' -----	
11	Build & test function of MUX using IC 74151/74150/any other equivalent	----- ' ' -----	IEG 306-3
12	Build / test function of DEMUX IC 74155/74154/any other equivalent	----- ' ' -----	IEG 306-3
13	Build Full Adder using multiplexer	----- ' ' -----	IEG 306-3
14	Build and test Priority encoder using IC 74147	----- ' ' -----	
15	Build/ test function of RS flip flop using NAND gate	----- ' ' -----	IEG 306-4
16	Build & test function of JK flip flop using IC 7476	----- ' ' -----	IEG 306-4
17	Use IC 7476 to construct & test the functionality of D and T flip flop.	----- ' ' -----	IEG 306-4
18	Build 4-bit Right Shift Register using D flip flop IC 7474	----- ' ' -----	IEG 306-4
19	Implement 4-bit Left Shift Register.	----- ' ' -----	IEG 306-4
20	Build 4-bit Ring Counter and Twisted Ring counter.	----- ' ' -----	IEG 306-4
21	Implement 4-bit ripple counter using IC 7476.	----- ' ' -----	IEG 306-4
22	Use IC 7490 to construct BCD and Mod-6	----- ' ' -----	IEG 306-4

	counter.		
23	Build 3-bit UP/DOWN ripple counter	----- ‘ ’ -----	IEG 306-4
24	Build MOD-12 Synchronous UP counter using IC 74160.	----- ‘ ’ -----	IEG 306-4
25	Build R-2R resistive network on breadboard to convert given digital data into analog output.	----- ‘ ’ -----	IEG 306-5

A.2 Suggestive Micro-project list:-

Each student should be allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. The number of students in the group should **not exceed three**.

The micro project could be Industry application based, internet based, workshop based, laboratory based or field based.

Each student have to maintain dated work diary consisting of individual contribution in the microproject work. He has to give seminar presentation of it before submission. The students ought to submit micro project by the end of the semester. Micro project report may be of four to five pages. Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

1. Build Digital IC tester.
2. Build a circuit to implement 4 bit Binary adder.
3. Build a circuit to implement One Digit BCD adder.
4. Build a circuit to test 7-segment decoder.
5. Build a circuit for LED flasher.
6. Build a circuit for LED BAR display.
7. Design and analyze Digital Arithmetic circuits
8. Build Digital Thermometer.
9. Build Digital Object Counter.
10. Build Digital stopwatch.
11. Build Digital water level controller for overhead tanks.
12. Build Decoration lights using LED's.
13. Build digital fan speed regulator.
14. Build a circuit for Home Automation Systems.

F) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEG 306-1: Use number system and codes for interpreting working of digital system.			

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 ASCII code	08	12
IEG 306-2: Use Boolean expressions to realize logic circuits.			
2	Boolean Algebras. 2.1 Boolean Algebra. Fundamentals of Boolean laws 2.2 Basic gates and derived gates, Ex-OR and EX-NOR gates (symbols and truth tables & IC's). 2.3 De Morgan's Theorems. (upto 2 variables) 2.4 Sum of Product (SOP) and Product of Sum (POS) reduction methods. 2.5 Maxterm and Minterm, 2.6 Standard conversion between SOP and POS form 2.7 K – map reduction techniques (upto 4 variables only SOP equations)	09	16
IEG 306-3: Analyze different Logic families & working of basic logic gates.			
3	Digital Logic Families 3.1 Characteristics of logic families (fan in, fan out, propagation delay, power dissipation, noise margin) 3.2 TTL family: Circuit diagram & working of TTL NAND gate 3.3 CMOS family: a) Circuit diagram & working of CMOS inverter b) Circuit diagram & working of CMOS NAND & NOR gates (2 inputs) 3.6 Comparison of logic families TTL & CMOS.	07	12

Section II

Sr. No.	Topics	Teaching hours	Marks
IEG 306-4: Build simple combinational circuits.			
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 Multiplexer, their uses in combinational Logic design, multiplexer tree. 4.8 Demultiplexers / decoders and their use in combinational logic design. 4.9 Study of IC's 74150 and 74154. 4.10 Study of decoder / drivers for 7-segment displays IC7447 4.11 Priority encoder IC 74147.	10	16
IEG 306-5: Build simple sequential circuits..			
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 4-bit Right & Left Shift register 5.7 Asynchronous/Ripple UP Counter (Mod-8,10 &12) 5.8 Ripple DOWN counter , UP/DOWN counter(3-bit). 5.9 Synchronous Counters UP counter (Mod-8 & Mod 10) 5.10 Study of IC's 7474, 7490, 74193, 74160, 7476, (logic Diagram and truth table only expected.)	10	16
IEG 306-6: Test data converters in digital electronics systems & identify memory types.			
6.	Data converters and Memories 6.1 DAC Types – Weighted resistor method and R-2R method, specifications of DAC 6.2 ADC types,specifications, block diagram and working of Dual slope ADC and SAR ADC 6.3 Classification of memories 6.4 RAM- Static, Dynamic and Volatile , Nonvolatile 6.5 ROM – PROM, EPROM, EEPROM	4	8

	6.6 Flash memory		
		Total	48
			80

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	Number systems and codes	4	4	4	IEG 306-1	12
2	Boolean algebra	4	6	6	IEG 306-2	16
3	Digital logic families	2	4	6	IEG 306-3	12
4	Combinational Logic Circuits	2	6	8	IEG 306-4	16
5	Sequential Logic Circuits	2	6	8	IEG 306-5	16
6	Data converters and Memories	2	2	4	IEG 306-6	8
TOTAL		16	28	36	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.

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

m) Assessment Criteria:

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 III**.

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 III

INSTRUCTIONAL STRATEGIES :

Instructional Methods :

1. Lectures cum Discussions
2. Regular Home Assignments.
3. Laboratory work
4. Google meet or Zoom platforms.

Teaching and Learning resources:

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

REFERENCE MATERIAL :

a) Books:-

Sr. No.	Author	Title	Publisher
1	R. P. Jain	Modern Computer Fundamentals	Tata McGraw-Hill
2.	Malvino	Digital Computer Electronics	Tata McGraw-Hill
3	Floyd	Digital Fundamentals	Pearson Education
4	Maini, Anil K.	Digital Electronics Principles & Integrated circuits	Wiley India Delhi
5	Malvino ,Leach & Saha	Digital Principles and Applications:	McGraw-Hill Education ,New Delhi

b) Websites:

- 1) www.asic-world.com/digital/tutorial.htm
- 2) www.nptel.ac.in
- 3) Youtube
- 4) VLAB IIT Kharagpur
- 5) MSBTE E-content
- 6) Slideshare etc.

COURSE ID:

Course Name : LINEAR INTEGRATED CIRCUITS
Course Code : EIG307
Course Abbreviation : GLIC

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	07
Practical	04	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	75E	175

* E-External Assessment *Assessment at semester end practical exam as per Pro-forma III.

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 components 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:

Maintain electronics circuits consisting of Linear integrated circuits.

Cognitive : Interpret the operation of IC 741 & IC555 based circuits.

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

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

COURSE OUTCOMES:

EIG307-1. Select the proper op-amp parameters for a given industrial application.

EIG307-2. Use various configuration of op-amp in electronics circuit.

EIG307-3 Examine and use linear and non-linear applications of op-amp.

EIG307-4 Maintain oscillators and multivibrators circuits using op-amp

EIG307-5 Illustrate operation of active filters and design various types of filters

EIG307-6 Examine operation of timer IC and its 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency Maintain electronics circuits consisting of Linear integrated circuits	1	2	2	2	2	1	3	3	2
EIG307-1	2	-	1	-	-	-	2	2	2
EIG307-2	-	2	2	2	-	1	3	3	2
EIG307-3	-	2	3	2	2	1	2	3	2
EIG307-4	-	1	-	2	2	-	3	2	2
EIG307-5	1	2	2	1	1	1	2	3	2
EIG307-6	-	2	1	2	2	1	3	3	2

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.

CONTENT:

A) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 20 out of 25 experiments).

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.	EIG 307-1
2.	Practical Parameter of Op-amp IC741	i) Measure the differential input resistance, input offset voltage, output offset voltage and CMRR. ii) Compare measured values with Datasheet of IC741.	EIG 307-1

3.	Output voltage swing parameter of Op-amp IC741	Measure Output voltage swing parameter of Op-amp IC741.	EIG 307-1
4.	Inverting Amplifier using op-amp IC741	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	EIG 307-2
5.	Non Inv. Amplifier using op-amp IC741	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	EIG 307-2
6.	Inverting and Non-Inverting Adder using op-amp IC741	i) Build the circuit as per circuit diagram ii) Measure and verify the output voltage for various combination of inputs for inverting and non-inverting adder.	EIG 307-2
7.	Subtractor using op-amp IC741	i) Build the circuit as per circuit diagram ii) Measure and verify the output voltage for various combinations of inputs for Subtractor.	EIG 307-2
8.	Active Integrator using op-amp IC741	i) Build the circuit as per circuit diagram ii) Verify and plot the output voltage for square wave, sine wave as a input	EIG 307-2
9.	Active Differentiator using op-amp IC741	i) Build the circuit as per circuit diagram. ii) Verify and plot the output voltage for square wave, sine wave as a input	EIG 307-2
10.	Inverting and Non-Inverting Zero Crossing Detector using op-amp IC741	i) Build the circuit as per circuit diagram. ii) Measure output of Inverting ZCD iii) Measure output of Non-Inverting ZCD	EIG 307-3
11.	V-I Converter with Floating load using op-amp IC741	i) Build the circuit as per circuit diagram. ii) Measure output current for given i/p voltage iii) Compare theoretical and practical values.	EIG 307-3
12.	V-I Converter with grounded load using op-amp IC741	i) Construct the circuit as per circuit diagram ii) Measure output current for given i/p voltage iii) Compare theoretical and practical values.	EIG 307-3
13.	I-V Converter using op-amp IC741	i) Construct the circuit as per circuit diagram ii) Measure output voltage for given i/p current iii) Compare theoretical and practical values.	EIG 307-3
14.	Monostable multivibrator using Op-amp IC741	i) Construct the circuit as per circuit diagram. ii) Verify and plot the output voltage for various RC combinations.	EIG 307-4
15.	Astable multivibrator using Op-amp IC741	i) Construct the circuit as per circuit diagram. ii) Verify and plot the output voltage for various RC combination	EIG 307-4

16.	Triangular wave Generator using op-amp IC741	i) Construct the circuit as per circuit diagram ii) Observe the square wave output at 1st op-amp sixth pin. iii) Observe the triangular wave output at 2nd op-amp sixth pin.	EIG 307-4
17.	RC Phase Shift Oscillator using Op-amp IC741	i) Construct the circuit as per circuit diagram. ii) Measure frequency of oscillation of RC Phase Shift oscillator.	EIG 307-4
18.	Wein Bridge Oscillator using Op-amp IC741	i) Construct the circuit as per circuit diagram ii) Measure frequency of oscillation of Wein Bridge Oscillator.	EIG 307-4
19.	Low pass filter using op-amp(1 st order)	i) Construct the circuit as per circuit diagram ii) Plot frequency Response of filters on semi log paper. iii) Measure and verify cut-off frequency of LPF.	EIG 307-5
20.	Low pass filter using op-amp(2 nd order) using Simulation Software	i) Construct the circuit as per circuit diagram ii) Record the readings & Plot frequency Response of filters on semi log paper. iii) Measure and verify cut-off frequency of LPF.	EIG 307-5
21.	High pass filter using op-amp(1 st order)	i) Construct the circuit as per circuit diagram ii) Record the readings & Plot frequency Response of filters on semi log paper. iii) Measure and verify cut-off frequency of HPF.	EIG 307-5
22.	High pass filter using op-amp(2 nd order) using Simulation Software	i) Construct the circuit as per circuit diagram ii) Record the readings & Plot frequency Response of filters on semi log paper. iii) Measure and verify cut-off frequency of HPF.	EIG 307-5
23.	Timer IC555	i) Identify Pin out of IC 555 ii) List the features of IC 555. iii) Identify the specifications of IC555.	EIG 307-6
24.	Monostable multivibrator using IC555	i) Construct the circuit as per circuit diagram. ii) Verify and plot the output voltage for various RC combinations. iii) Measure the Ton and Toff i.e duty cycle	EIG 307-6
25.	Astable multivibrator using IC555	i) Construct the circuit as per circuit diagram. ii) Verify and plot the output voltage for various RC combination iii) Measure the Ton and Toff i.e duty cycle	EIG 307-6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- Build Instrumentation amplifier (IC LM324) for measuring of temperature using thermistor/RTD/Thermocouple.
- Build sound sensor circuit IC 741 and microphone
- Build Clamp switch using IC741
- Build shadow sensor circuit using IC741
- Develop tone generator using IC555
- Develop PWM LED Dimmer/Brightness control using IC55
- Simulate using Orcad capture software linear IC applications.

Note: Use general purpose PCB for making Microprojects.

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>EIG307-1. Select the proper op-amp parameters for a given industrial application.</i>			
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	06	12

	consumption, Slew rate.		
<i>EIG307-2. Use various configuration of op-amp in electronics circuit.</i>			
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 Inverting and Non-Inverting amplifier, adder and Subtractor.	10	14
<i>EIG307-3 Examine and use linear and non-linear applications of op-amp.</i>			
3	Op-Amp. Applications (Circuit Diagram , Operation, Equation and applications) 3.1 Voltage comparator: 3.1.1 Inverting & non inverting comparator(transfer characteristics) 3.1.2 Zero crossing detector-Inverting & Non-inverting 3.1.3 Window comparators(Detector) 3.1.4 Inverting Schmitt Trigger 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 Precision Rectifier: Half wave and Full Wave 3.5 Three op amp Instrumentation amplifier Circuit diagram, operation, advantages& application.	08	14
	Sub-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)
<i>EIG307-4 Maintain oscillators and multivibrators circuits using op-amp</i>			
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.	08	14
<i>EIG307-5 Analyze operation of active filters and design various types of filters</i>			
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 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 1 st order and 2 nd order filters(LPF & HPF)	10	16
<i>EIG307-6 Examine operation of timer IC and its applications.</i>			
6	Timer IC's 6.1 555 pin out ,block diagram and specification 6.2 555 as monostable multivibrator 6.3 555 as astable multivibrator 6.4 555 as bistable multivibrator	06	10

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	6.5 Application of IC555 as Water level controller, VCO and Schmitt Trigger		
	Sub-Total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Basics Of Operational Amplifier	02	04	06	EIG307-1	12
2	Op-Amp Configuration & f/b amplifiers	04	04	06	EIG307-2	14
3	Op-Amp Applications	04	04	06	EIG307-3	14
4	Waveform Generators	04	04	06	EIG307-4	12
5	Active filters	04	06	06	EIG307-5	14
6	Timer IC's	02	04	04	EIG307-6	10
	Total >>	20	26	34		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety	05

	Measures/ Decency/ Presentation	
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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma III.*

b) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board
2. Video clips
3. PPTs
4. Question 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	Operational Amplifier	Newnes-Butterworth
5	Driscoll	Basic Op-Amp. Circuits	Prentice Hall, 2000

b) Websites:

- 1) <http://www.nptel.ac.in>
- 2) <http://www.khanacademy.org>
- 3) https://www.tutorialspoint.com/linear_integrated_circuits_applications/
- 4) https://www.electronics-tutorials.ws/waveforms/555_timer.html
- 5) <https://www.engineersgarage.com/tutorials/555-timer-ic-introduction-basics-working-with-different-operating-modes/>
- 6) Video lectures: <https://freevideolectures.com/course/2915/linear-integrated-circuits>
- 7) Video Lectures: <https://ekeeda.com/>

* * *

COURSE ID:

Course Name : **CIRCUITS AND NETWORKS**
Course Code : **EIG 308**
Course Abbreviation : **GCKN**

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		Total
	Theory	Practical	Theory	Practical *and Micro-project	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical and Micro-project Exam (3 hours)	
Marks	20	--	80	50I	150

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

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.

This course is designed in such a way that, the students will able to apply knowledge to solve electronics engineering applications.

COMPETENCY:

Analyze various circuits and networks for different engineering applications predict circuit responses.

Cognitive: Understanding circuit behavior.

Psychomotor: Determining circuit responses using various network theorems.

Affective: Attitude of i) Logic ii) Accuracy iii) Precision iv) Test

COURSE OUTCOMES:

EIG 308-1 Apply different rules and laws for circuit analysis.

EIG 308 -2Differentiate series and parallel circuits.

EIG 308 -3 Predict circuit responses using network theorems.

EIG 308 -4 Design RC circuits

EIG 308-5Analyze output of resonant circuits.

EIG 308-6 Select appropriate filters as per requirement

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency : Analyze various circuits and networks for different engineering applications predict circuit responses	3	2	2	2	1	1	3	3	2
EIG308-1	3	2	2	2	-	1	3	2	2
EIG 308 -2	3	2	-	2	-	1	3	2	1
EIG 308 -3	3	2	2	2	-	2	3	3	2
EIG 308 -4	3	2	2	2	-	2	3	1	1
EIG 308-5 ts.	3	2	-	2	-	1	2	1	1
EIG 308-6	3	-	2	1	1	-	3	1	1

CONTENT:

A.1 Suggested Practical's/ Exercise

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 experiments). Experiments numbered from 13 onwards can be performed or demonstrated by using simulation software.

Sr No .	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Verify series and parallel combination formulae of resistors	1)Tracing and Connection of circuit 2)Calculation of parameters 3)Formulation of result	EIG 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	EIG 308-1
3	Verification of KVL	1.Tracing and Connection of circuit 2.Calculation of parameters 3 .Formulation of result	EIG 308-1
4	Verification of KCL	1.Tracing and Connection of circuit	EIG 308-

		2.Calculation of parameters 3.Formulation of result	2
5	Verify Superposition Theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIG 308-3
6	Verify Thevenin's theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIG 308-3
7	Verify Maximum Power Transfer theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIG 308-3
8	Verify Norton's theorem	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIG 308-3
9	Analysis of simple RC circuit	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIG 308-4
10	Analysis of simple RLC circuit	1.Tracing and Connection of circuit 2.Calculation of parameters 3.Formulation of result	EIG 308-5
11	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	EIG308-6
12	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	EIG308-6
13	Verification of equivalent resistance formulae using simulation software	1.Build circuit in relevant software 2.Check equivalent resistance	EIG 308-2
14	Verification of KVL using simulation software	1.Build circuit in relevant software 2.Verify KVL	EIG 308-1
15	Verification of KCL using simulation software	1.Build circuit in relevant software 2. Verify KCL	EIG 308-1

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 2nd, 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

a) Verification of KVL (Build given circuit on PCB and verify Law)

- b) Verification of KCL (Build given circuit on PCB and verify Law)
- c) Principles of circuit analysis (Prepare power point presentation on source transformation, mesh analysis, nodal analysis and present it in classroom)
- d) Superposition Theorem (Select proper components for given circuit and build it on PCB and verify theorem theoretically and practically)
- e) Thevenin's Theorem (Select proper components for given circuit and build it on PCB and verify theorem theoretically and practically)
- f) Norton's Theorem (Select proper components for given circuit and build it on PCB and verify theorem theoretically and practically)
- g) Maximum power transfer theorem (Select proper components for given circuit and build it on PCB and verify theorem theoretically and practically)
- h) Resonance circuit (Build series RLC resonance circuit on PCB and tune it to resonance condition and find out quality factor and bandwidth)
- i) Resonance circuit (Build parallel RLC resonance circuit on PCB and tune it to resonance condition and find out quality factor and bandwidth)
- j) Low pass filter (Build RC low pass filter for given cut off frequency on PCB and draw its response on semilog paper)
- k) High pass filter (Build RC high pass filter for given cut off frequency on PCB and draw its response on semilog paper)

C. THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>EIG 308-1 Apply different rules and laws for circuit analysis</i>		
1	BASIC THEORY 1.1 Electric charge and current 1.2 AC and DC circuits 1.3 Short and open circuit 1.4 Ohm's law 1.5 Energy and power in resistor circuits 1.6 Kirchhoff's voltage law	08	14

	1.7 Kirchhoff's current law 1.8 Voltage divider rule 1.9 Current divider rule (Numericals on above topic)		
	EIG 308 -2 Differentiate series and parallel circuits.		
2.	CIRCUIT SIMPLIFICATION TECHNIQUES 2.1 Series and parallel circuits 2.2 Mesh analysis 2.3 Nodal analysis 2.4 Concept of ground 2.5 Voltage and current source 2.6 Source transformation (Numericals on above topics)	06	12
	EIG 308 -3 Predict circuit responses using network theorems		
3	NETWORK THEOREMS 3.1 Superposition theorem 3.2 Thevenin's theorem 3.3 Norton's theorem 3.4 Maximum power transfer theorem (Numericals on above topics)	10	14
	Sub total	24	40

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Sr. No.	Topics	Teaching hours	Marks
	EIG 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)	10	14
	EIG 308-5 Analyze output of resonant circuits		
5	RLC CIRCUITS AND RESONANCE 5.1 Series resonance 5.2 Parallel resonance 5.3 Bandwidth and quality factor in resonance circuit 5.4 Voltage and current in resonance circuit 5.5 Magnification in series and parallel resonance circuit 5.6 Applications of resonance circuits like filters, IF amplifiers (only introduction)	06	10

	(Numericals on above topic)		
EIG 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	08	16
	Sub total	24	40
	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 (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
1	Basic Theory	02	04	08	EIG308-1	14
2	Circuit Simplification Techniques	02	04	06	EIG308-2	12
3	Network Theorems	02	04	08	EIG308-3	14
4	R-L and R-C Circuits	02	04	08	EIG308-4	14
5	RLC Circuits and Resonance	02	04	04	EIG308-5	10
6	Passive Filters	02	06	08	EIG308-6	16
	Total >>	12	26	42		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

o) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/ Algorithm/ flowchart	05
	Observation/ Logic/ Program/ Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	05
TOTAL		25

ii) Progressive Skill Test:

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

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

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

p) Assessment Criteria for Term-end Practical Examination:

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	Technical ability	10

2	Correct figures / diagrams/ Logic	10
3	Observation table/ Algorithm/ flowchart/ Program	10
4	Correctness of - Result / Output / Calculations / Graphs	10
5	Safety / Use of proper tools / overall Decency & Presentation / Workmanship	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

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

Teaching and Learning Resources:

1. Chalk and board 2. Video clips 3. PPT 4. question Bank

REFERENCE MATERIAL :

a) Books / Journals / IS 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

- i) www.tatamcgrawhill.com
- ii). www.mhne.com/ravish/ens
- iii). www.electrical4u.com/rle-circuit
- iv) <https://www.electricaltechnology.org/category/basic-electrical-fundamentals>
- v) <https://www.elprocus.com/basics-of-network-theorems-in-electrical-engineering>
- vi) https://www.oreilly.com/library/view/introduction-to-electric/9781118477502/12_chap05.html
- vii) <https://electrical-engineering-portal.com/resources/knowledge/theorems-and-laws>
- viii) <http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=93231>
- ix) https://learnabout-electronics.org/ac_theory/filters81.php

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COURSE ID:

Course Name : MICROCONTROLLERS
Course Code : EIG 309
Course Abbreviation : GMCS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIG 306

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	07
Practical	04	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks	(i) 25 marks for each practical (ii) One PST of 25 marks	Theory exam (3hours)	Term End Practical Exam (03 hours)	
Marks	20	----	80	75E	175

* E-External Assessment *Assessment at semester end practical exam as per Pro-forma III.

RATIONALE:

A microcontroller is the sole of all embedded electronic types of equipment and is used in most areas of electrical/electronics where automation and monitoring are needed. They include product lines ranging from small consumer electronic products to sophisticated industrial process controllers. A diploma engineer needs to maintain such systems. Programming practices will further enhance students' ability to develop local applications based on microcontrollers. Hence this course is designed to address the above.

COMPETENCY:

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Maintain microcontroller based equipment's/system.**

Cognitive: Understand assembly language programming and peripheral interfacing

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

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

COURSE OUTCOMES:

EIG 309-1: Interpret prominent features of different kinds of microcontrollers.

EIG 309-2: Interpret the salient architectural features of 8051 microcontroller

EIG 309-3: Develop and maintain assembly language program for different operations

EIG 309-4: Interface and program different I/O devices with 8051 in assembly

EIG 309-5: Maintain different 8051 based 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Maintain microcontroller based equipments/system.:	1	3	3	1	-	-	-	3	3
EIG 309-1	1	1	2	-	-	-	-	2	2
EIG 309-2	1	3	2	-	-	-	-	2	2
EIG 309-3	-	3	3	1	-	-	-	2	2
EIG 309-4	1	2	3	1	-	-	-	3	3
EIG 309-5	1	2	-	-	-	-	-	3	3

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.

CONTENT:

G) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 20 out of 25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Interpret details of Hardware kit for Microcontroller and practice to write and execute programs.	3) Identify each block of Hardware kit. 4) Understand the use and operating procedure of 8051 Hardware kit.	EIG309-1
2	Identify different menus available in compiler software KEIL and demonstrate their use.	1) Use KEIL compiler software for assembly language programming 8051 microcontroller	EIG309-2

		2) Understand the useful menus available in KEIL for 8051 Microcontroller programming	
3	Develop and execute Assembly language programs using Arithmetic Instructions and demonstrate outcome for a given input data	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
4	Develop and execute Assembly language programs using Logical Instructions and demonstrate outcome for a given input	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
5	Develop and execute an Assembly language program for Addition of series of 8 bit nos, 16 bit result and demonstrate outcome for a given input data	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
6	Develop and execute Assembly language program for addition/subtraction of 16 bit no/multibyte nos. and demonstrate outcome for a given input data	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
7	Develop and execute Assembly language program for Block transfer from and to Internal/External memory using directives and demonstrate outcome for a given input data	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
8	Develop and execute Assembly language program Largest/smallest of given series of no. from Internal/External memory and demonstrate outcome for a given input data.	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
9	Develop and execute Assembly language program arrange no in ascending/descending order from Internal/External memory and demonstrate outcome for a given input data.	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3
10	Develop and execute Assembly language program to interface LED with 8051 microcontroller and turn it on of using switch	1) Acquire Logical thinking ability 2) Interfacing LED and switch with 8051 MC 3) Identify the suitable instructions for the given problem Writing, Compiling, debugging, and execution of program	EIG309-3,4
11	Develop and execute Assembly language	1) Acquire Logical thinking ability	EIG309-

	program for LED blinking/LED sequences using delay/timer mode.	2) Interfacing LED with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	3,4
12	Develop and execute Assembly language program for seven segment display to display 0 to 9 decimal number.	1) Acquire Logical thinking ability 2) Interfacing seven segment display with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4
13	Develop and execute Assembly language program to generate square wave of 5ms at P1.0 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	EIG309-3,4
14	Develop and execute Assembly language program to count external events using counter mode.	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3,4
15	Interface Relay with microcontroller and Turn it On and Off after every 1s using Timer.	1) Acquire Logical thinking ability 2) Interfacing Relay with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4
16	Develop and execute Assembly language program to transfer 8 bit data serially on serial port	1) Acquire Logical thinking ability 2) Identify the suitable instructions for the given problem 3) Writing, Compiling, debugging, and execution of program	EIG309-3,4
17	Develop and execute Assembly language program to interface LED with microcontroller and turn it On and Off using microcontroller Interrupt	1) Acquire Logical thinking ability 2) Interfacing LED with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4
18	Interface LCD with 8051 microcontroller to print some welcome message on it.	1) Acquire Logical thinking ability 2) Interface LCD with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5
19	Develop a 4 bit binary counter with 8051 and display output count on LCD	1) Acquire Logical thinking ability 2) Interface LCD with 8051 MC 3) Identify the suitable instructions for the given problem	EIG309-3,4,5

		4) Writing, Compiling, debugging, and execution of program	
20	Interface the given Key board with 8051 and display the key pressed.	1) Acquire Logical thinking ability 2) Interface 4x4 keypad with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5
21	Interface ADC with 8051 and verify input and output.	1) Acquire Logical thinking ability 2) Interface ADC with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5
22	Interface DAC with 8051 and observe following waveform: square wave, triangular wave, saw-tooth wave.	1) Acquire Logical thinking ability 2) Interface DAC with 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5
23	Develop a program to interface a DC Motor with 8051	1) Acquire Logical thinking ability 2) Interface DC motor using motor driver to 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5
24	Develop a program to interface a Stepper Motor with 8051	1) Acquire Logical thinking ability 2) Interface Stepper motor using Motor driver to 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5
25	Interface 8051 with external memory	1) Acquire Logical thinking ability 2) Interface external RAM to 8051 MC 3) Identify the suitable instructions for the given problem 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work. Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- a) Prepare a chart of various features using data sheets of 8051 microcontroller and its derivaives
- b) Prepare chart for stepper motor to display its features and steps for its operations using data sheets
- c) Prepare a chart of various types of LCDs to display its features, pin functions and step of operations using data sheet
- d) Build a circuit to turn the buzzer ON after 10 seconds
- e) Build a classperiod bell using a microcontroller
- f) Build a stepper motor controller using microcontroller
- g) Build a traffic light controller for specific delay
- h) Build a water level controller for given parameters.
- i) Build a Tempareture controller for given parameters.
- j) 4 Channel Quiz Buzzer using 8051 Microcontroller
- k) Digital Voltmeter using 8051 Microcontroller

H) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG 309-1: Interpret prominent features of different kinds of microcontrollers			
1	Introduction to Microcontrollers 1.1 Evolution of Microcontrollers 1.1.1 Block diagram of Microcomputer 1.1.2 ElementsofMicrocomputer (Buses Microprocessor, Memory,I/O devices) 1.1.3 Types of buses (Address, Data and control bus) 1.2 Types of architectures: Von Neuman and Harward Architecture. 1.3 Compare Microprocessor and Microcontrollers 1.4 Need of Microcontroller 1.5 Introduction and technical specifications of various microcontrollers : 1.5.1 8051 Microcontroller 1.5.2 PIC Microcontroller 1.5.3 AVR Microcontroler 1.5.4 ARM Microcontroller 1.5.5 Compare all listed microcontroller with the	6	10

	parameters(Bits,Memory,instruction set & memory architecture) 1.6 Introduction to Microcontroller programming simulation software like – KEIL compiler		
EIG 309-2: Interpret the salient architectural features of 8051 microcontroller			
2	Architecture of 8051Microcontroller 2.1 8051 Architecture: 2.1.1 Features 2.1.2 Architectural Block diagram of 8051, function of each block 2.1.3 Pin diagram, function of each pin 2.1.4 Memory organization of Internal memory (RAM and ROM) 2.1.5 Reset and clock circuit 2.1.6 Various registers and SFRs of 8051 2.2 Special Features of 8051 2.2.1 Boolean Processor 2.2.2 Power saving options- idle and power down mode.	8	12
EIG 309-3: Develop and maintain assembly language program for different operations			
3	8051 Instruction Set and Programs 3.1 Overview of 8051 instruction set 3.1.1 Instruction Format for 8051 Microcontroller 3.1.1 Introduction to Assembler and Various addressing modes 3.2 Classification of instructions 3.2.1 Data transfer instructions 3.2.2 Arithmetic instructions 3.2.3 Logical instructions 3.2.4 Branching instructions 3.2.5 Bit manipulation instructions 3.2.6 Stack, subroutine and interrupt related instructions 3.3 simple Programs based on above instructions.	10	18
	Sub-total	24	40

Section II

Sr. No.	Topics	Teaching hours	Marks
EIG 309-4: Interface and program different I/O devices with 8051 in assembly			
4.	8051 Internal Peripherals and Related Programs 4.1 Parallel Port-I/O port Structure and its Programming 4.2 I/O interfacing: LED, Relays, Seven segment display 4.3 Timer/Counter programming 4.3.1 Timer / Counter logic and modes 4.3.2 Simple programs on timer to generate time delay and square wave.	8	16
EIG 309-5: Maintain different 8051 based applications			
5	Serial communication and Interrupt programming 5.1 Serial port of 8051 5.1.1 Serial communication SFRs: SCON, SBUF, PCON 5.1.2 Modes of serial communication 5.1.3 Simple programs for serial communication 5.2 8051 Interrupts 5.2.1 Interrupts and polling concept. 5.2.2 Interrupts SFRs: IE, IP 5.2.3 Simple programs based on interrupts and polling method 5.3 Memory interfacing: Program and data memory	8	16
EIG 309-6 Maintain different 8051 based applications			
6.	Peripheral interfacing and Applications Interfacing diagram with programming of following with 8051 6.1 Key-board interfacing (4X4 Matrix keyboard), concept of key bouncing and debounce logic. 6.2 LCD display interfacing 6.3 8 bit ADC and DAC interfacing (0808/0809) 6.4 DC and Stepper Motor interfacing	8	8
	Sub total	24	40
	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:

Top ic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Rememb er	Understand	Application		
1	Introduction to Microcontrollers	02	04	04	EIG309-1	10
2	Architecture of Microcontroller 8051	02	04	06	EIG309-2	12
3	8051 Instruction Set and Programs	02	06	10	EIG309-3	18
4	8051 Internal Peripherals and Related Programs	02	06	08	EIG309-4	16
5	Serial communication and Interrupt programming	02	06	08	EIG309-4	16
6	Peripheral interfacing and Applications	02	02	04	EIG309-5	08
	Total >>	12	28	40		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

q) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma III*

r) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3.PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Kenneth, Ayala	8051 Microcontroller Architecture Programming and Application	PHI Learning
2.	Mazidi, Mohmad Ali; Mazidi, Janice Gelispe; MckinlayRoline D.	The 8051 Microcontroller and Embedded system	Pearson Education
3.	Pal, Ajit,	Microcontroller Principle and Application	PHI Learning
4	Deshmukh, Ajay	Microcontroller Theory and Application,	McGraw Hill.
5	Kamal, Raj,	Microcontroller Architecture Programming, Interfacing and System Design	Pearson Education India,
6	Mathur; Panda,	Microprocessors and Microcontrollers	PHI Learning
7	Krishna Kant,	Microprocessors and Microcontrollers: Architecture programming and System Design	PHI Learning

b) Websites

- 1) www.nptel.iitm.ac.in
- 2) www.learningaboutelectronics.com
- 3) www.futurlec.com
- 4) www.bis.org.in
- 5) www.electrical4u.com
- 6) www.cadsoft.io
- 7) www.electronics-tutorials.com

* * *

COURSE ID :

Course Name : ELECTRICAL MACHINES
Course Code : IEG 310
Course Abbreviation : GEMC

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : EIG107

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-IV	
Marks	20	--	80	50I	150

*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:

IEG 310-1 Use DC machines in industrial applications.

IEG 310-2 Select transformers relevantly and use them in industrial applications.

IEG 310-3. Select relevant single phase induction motors and use them in industrial applications

IEG 310-4. Use appropriate alternators as per requirement

IEG 310-5. Select three phase induction motors relevantly and use them in industrial applications

IEG 310-6 Select the relevant special motors for industrial 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Understand fundamental principle and concept of basic electrical devices	1	3	3	1	-	-	-	3	3
IEG310-1	1	1	2	-	-	-	-	2	2
IEG310-2	1	3	2	-	-	-	-	2	2
IEG310-3	-	3	2	1	-	-	-	2	2
IEG310-4	1	2	2	1	-	-	-	3	3
IEG310-5	1	2	2	1	-	-	-	3	3
IEG310-6	3	3	-	-	-	-	-	3	3

CONTENT:

I) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 'X' experiments).

Sr. No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
01.	Dismantle a DC machine.	1. Identify parts of the machine. 2. List the D.C. Machines in the laboratory.	IEG 310-1
02.	To perform load test on D.C.shunt motor	1.Power stages in a D.C.machines	IEG 310-1
03	To study the starting and reversal a of D.C.Shunt Motor	1.Working principle of d.c.motor 2. Interaction of fields and resultant fields.	IEG310-1
04	Three point starter of DC shunt motor	1. Connect the starter and run the machine	IEG310-1
05	Check the functioning of single phase transformer.	Identify parts of the single phase transformer	IEG310-2
06	To verify the transformation ratio of single phase transformer	1. Connect as per circuit diagram 2.To observe the working principle of transformer	IEG310-2

07	Perform direct load test on 1 ph transformer to find efficiency and voltage regulation regulation.	1. Connect as per circuit diagram. 2.Observe the voltage drops in transformer	IEG310-2
08	Check the functioning of isolation transformer.	Identify parts of the isolation transformer	IEG310-2
09	Test the pulse transformer	To connect as per circuit	IEG310-2
10	Construction of single induction motor	1. Identify parts of the machine	IEG310-3
11	To perform load test on single phase induction motor.	1.Perform the test and provide conclusion	IEG310-3
12	Relation between line and phase values of voltages and current in star and delta.	1.To connect as per circuit	IEG310-4
13	Dismantle of 3phase Induction Motor	1.Identify parts of the machine	IEG310-5
14	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	IEG310-5
15	To measure the slip of three phase induction motor by tachometer method	1. Production of rotating magnetic field. 2.Lens law 3.Principle of operation of three phase induction motor	IEG310-5
16	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	IEG310-5
17	Construction of stepper Motor.	Identify parts of the machine	IEG310-6
18	Study of servo motor	Identify parts of the machine	IEG310-6

A.2 Micro-project

Each student should allotted one micro project in the beginning of the semester. In 2nd and 4th semester the micro projects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each micro project should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the micro project work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of micro projects is as follows:

- Prepare a report on different market survey of D.C.Machines
- Prepare a chart of different industrial applications of D.C.Machines
- Prepare a power point presentation related to D.C.Machines

- d. Prepare a power point presentation related to single phase transformer
- e. Prepare charts for construction of various AC motors.
- f. Compare various AC motors according to its applications.
- g. Prepare/Download a dynamic animation to illustrate the following:
 - Working principle of 3 phase induction motor
 - Working principle of 3 phase alternator
 - Working of different types of 3 phase induction motor starters
- h. Carry out a market survey of local dealers for 1-phase Induction motor and compare them on following points:
 - i) Rating ii) Method of starting iii) Cost iv) Starting torque and v) Performance
- i. Download the catalogue of three phase induction motor, Synchronous motor and alternator from websites of reputed manufacturers such as BHEL, SIMENS, CROMPTON, JYOTI, ABB, VOLTAS etc. to learn the latest Developments
- j. Identify the different Electrical machines working in any kind of Industry. Make a survey of all electrical AC machine and prepare a report on it.
- j. Prepare a drawing sheet for construction, working and application of single phase induction motor.
- k. Prepare demo model of single phase alternator/motor
- l. Prepare a report on market survey on special motors.

B. THEORY:

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>IEG310-1 Use DC machines in industrial applications</i>			
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 with schematic diagram 1.4 Characteristics & application of series shunt & compound generator. 1.5 Concept of Back EMF in case of DC motors. 1.6 Characteristics & application of series shunt & compound motor. 1.7 Three point starter- Necessity, Construction, Working	07	12
<i>IEG310-2 Select transformers relevantly and use them in industrial applications</i>			
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,	09	16

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	voltage level and duty hours. 2.5 Construction of single phase Transformer 2.6 E.M.F.equation of Transformer 2.7 Losses in Transformer 2.8 Methods of finding efficiency & voltage regulation of transformer. 2.9 Concept of isolation transformer 2.10 Application of isolation transformer 2.11 Pulse transformer: constructional features and applications. 2.12 Concept of earthing in transformer and its importance.		
IEG310-3 Select relevant single phase induction motors and use them in industrial applications			
3	SINGLE PHASE INDUCTION MOTOR 3.1 Capacitor start capacitor run motor 3.2 Shaded Pole induction motor 3.3 A.C. Series Motor 3.4 Repulsion Motor Construction, Working Principle, Operation, Speed Torque characteristics & Applications of above motor	08	12
	TOTAL		40

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
IEG310-4. Select three phase alternator relevantly and use them in industrial application			
4	THREE PHASE ALTERNATOR 4.1 Poly phase supply system. 4.1.1 Concept of Star and Delta connection and relation between line and phase values of voltages and currents. 4.2 Construction of three phase Alternator 4.3 Working principle of three phases Alternator. 4.4 Types of Alternator according to the rotor construction. 4.5 Excitation system for alternator. 4.6 Advantages of stationary armature.	07	12
IEG310-5 Select three phase induction motor relevantly and use them in industrial application			
5	THREE PHASE INDUCTION MOTOR 5.1 Introduction to three phase induction motor-construction	08	14

	5.2 Working Principle of three phase induction motor. 5.3 Production of rotating magnetic field by 3 phase supply in 3 phases winding. 5.4 Synchronous speed –slip speed 5.5 Slip of an induction motor 5.6 Study of starters-Auto Transformer , Rotor Resistance Starter ,Star Delta Starter 5.7 Applications of 3 phase squirrel cage motor and slip ring induction		
IEG310-6 Select the relevant special motors for industrial applications			
6	Special Motors 6.1 Unidirectional and bi-directional stepper motor 6.2 Permanent magnet stepper motor with 2 phase winding 6.3 Variable reluctance stepper motor 6.4 D.C. Servo Motor 6.5 A.C Servo Motors :Single Phase, Two Phase & Drag cup servo motor Construction , working principle , Characteristics, applications	09	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 :

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

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

s) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for	05

	practical	
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/ Logic/ Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/Safety Measures/Decency/Presentation	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 X*.

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

t) Assessment Criteria for Term-end Practical Examination:

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	Technical ability	05
2	Correct figures / diagrams/ Logic	05
3	Observation table/Algorithm/flowchart/Program	05
4	Correctness of - Result / Output/ Calculations / Graphs	05
5	Safety / Use of proper tools / overall Decency &Presentation/ Workmanship	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. PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL :

S.No.	Name of Book	Author	Publication
1.	Electrical Machines	Kothari D. P. Nagrath I. J.	Tata McGraw-Hill, New Delhi, latest edition
2.	Electrical Machines	Ashfaq Hussain	Dhanpat Rai and Company, New Delhi
3	Electrical Machinery	Bimbhra P. S.	Khanna Publishers, New Delhi, latest edition
4	Electrical Technology Volume II	Theraja B.L.	S. Chand & Company
5	Electrical Machines	Bhattacharya S.K.	Tata McGraw-Hill
6	The performance & design of a.c. machines	Say M.G.	CBS Publication

b) Websites

1. <https://www.electricaleasy.com>
2. [www.electrical 4 u.com](http://www.electrical4u.com)
3. www.nptel.iitm.ac.in
4. <https://circuitglobe.com/induction-motor.html>
5. www.nptel.iitm.ac.in
6. [http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine learning-fall-2006/](http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/)
7. <http://www.indiabix.com/online-test/electrical-engineering-test/143>
8. <http://freevideolectures.com/Course/3085/Electrical-Machines-I>
9. <http://www.learn-about-electronics.com/AC-current-motors.html>
10. <http://dcacmotors.blogspot.in/2009/04/capacitor-start-single-phase-induction.html>
11. <http://synchronousmotor.specaproduct.com/>
12. http://www.engineersedge.com/motors/synchronous_motor.htm

* * *

LEVEL- IV

APPLIED TECHNOLOGY

COURSES

COURSE ID:

Course Name : **SIMULATION SOFTWARE**
Course Code : **EIG401**
Course Abbreviation : **GSIM**

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : **NIL**

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	-	4
Practical	4	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	--	--	--	50I	50

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

RATIONALE:

Industry expects a Diploma Engineer (technologist) to use modern day Electronic Design Automation (EDA) tools for analyzing, designing, and real time testing of analog, digital, and mixed electronic circuits and their PCB layouts. These operations are useful in developing, fabricating and testing new prototype circuits. Using basic features of EDA tool prepares student for learning advanced aspects of the modern EDA tool such as MATLAB, SCILAB and Orcad Capture using the simulation software for design of complex circuits.

EDA tool such as MATLAB, SCILAB and Orcad Capture etc 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.

COMPETENCY:

Design and simulate various electronic circuits using software tool.

Cognitive: Understand applications of MATLAB, SCILAB and OrCAD tool.

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

Affective: Analyze and simulate electronic circuits

COURSE OUTCOMES:

EIG401-1 Identify and use different application tools of Matlab/Scilab.

EIG401-2 Use and write Matlab/Scilab programs using various function as per requirements.

EIG401-3 Build various models in simulink as per industry requirements.

EIG401-4 Identify and use different application tools of OrCAD.

EIG401-5 Design, Simulate and create PCB layout of electronic 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Design and simulate various electronic circuits using software tool.	1	2	3	2	1	2	3	2	2
EIG 401-1	1	-	1	2	1	-	2	2	1
EIG 401-2	1	1	-	1	-	1	1	1	1
EIG 401-3	-	2	3	-	-	2	3	1	2
EIG 401-4	1	-	1	2	1	1	2	2	1
EIG 401-5	-	2	3	-	-	2	3	1	2

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.

CONTENT:

A) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 20 out of 25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Introduction to MATLAB IDE /Scilab	Identify different tools of MATLAB/Scilab	EIG401-1
2	Matlab/Scilab Command line window	Identify and use different basic Matlab/Scilab commands-I/O, Arithmetic, algebraic etc.	EIG401-1, EIG401-2
3	Mathematical operations in MATLAB/Scilab	i) Verify simple mathematical operations of all elements in row/column vector using MATLAB/Scilab.	EIG401-2

		ii) Perform different mathematical operation in Matlab/Scilab.	
4	Matrix Operations	i) Evaluate the mathematical operation using matrix. ii) Write the program in Matlab/Scilab to perform various matrix operations.	EIG401-2
5	Plotting functions	i) Identify and Use various plotting functions in MATLAB/Scilab. ii) Write the program using Plot function in MATLAB/Scilab.	EIG401-3
6	File handling & String manipulation	i) Identify and use file handling and string manipulation in Matlab/Scilab ii) Write the program using file handling and string manipulation in Matlab/Scilab.	EIG401-3
7	Looping & Branching instructions	i) Use looping and branching instruction in Matlab/Scilab. ii) Write the program using looping and branching instructions.	EIG401-1, EIG401-2
8	Introduction to Communication BlockSet	Identify various blocks in Communication blockset and state their functions.	EIG401-3
9	Analysis of Amplitude Modulation	i) Construct the model of amplitude modulation system in MATLAB/Scilab ii) Verify the output as per design.	EIG401-3
10	Analysis of Frequency Modulation	i) Construct the model of frequency modulation system in MATLAB/Scilab. ii) Verify the output as per design.	EIG401-3
11	Introduction to OrCAD tools - OrCAD Capture, OrCAD PSpice, OrCAD Layout	Identify and use different tools of OrCAD.	EIG401-4
12	Designing circuit using OrCAD Capture such as Rectifiers, Filters, Amplifier- Oscillators, Multivibrators	Design simple electronic circuits using OrCAD Capture tool.	EIG401-4, EIG401-5
13	Analysis of electronic circuits using OrCAD Pspice	Stimulate and verify the output of simple electronic circuits designed using OrCAD tool Capture.	EIG401-5
14	PCB Layout designing of of above electronic circuits using OrCAD Layout	Design PCB layout of simple electronic circuits designed using OrCAD Layout.	EIG401-5
15	Realize Boolean expression using logic gates and verify its truth table by simulation software.	Construct the circuit for a Boolean expression using logic gates and verify its truth table using orcad.	EIG401-4, EIG401-5
16	Simulate adder/subtractor and verify the truth table.	Construct the circuit of adder/subtractor and verify its truth table using orcad.	EIG401-4, EIG401-5
17	Verification of equivalent resistance formulae using simulation software	i) Construct the circuit as per circuit diagram in simulation software.	EIG401-4, EIG401-5

		ii) Stimulate equivalent resistance formulae. iii) Verify theoretical and practical equivalence resistance values.	
18	Verification of KVL using simulation software	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the above circuit. iii) Verify theoretical and practical values of the above circuit.	EIG401-4, EIG401-5
19	Verification of KCL using simulation software	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the above circuit. iii) Verify theoretical and practical values of the above circuit.	EIG401-4, EIG401-5
20	Clamper and Clipper Circuit using simulation software	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the above circuit. iii) Check output response.	EIG401-4, EIG401-5
21	V-I Characteristics of Diode	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the above circuit iii) Record the measured readings in observation table iv) Plot the forward & reverse characteristics	EIG401-5
22	Single stage CE and Two stage RC coupled amplifier using Transistor/FET	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the constructed circuit iii) Plot frequency response.	EIG401-5
23	Inverting and Non-inverting amplifier using IC 741 op-amp	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the constructed circuit iii) Verify theoretical and practical values of output	EIG401-5
24	1 st order Low Pass and High Pass Butterworth filter using IC 741 op-amp.	i) Build the circuit as per circuit diagram in simulation software. ii) Stimulate the constructed circuit iii) Plot frequency response.	EIG401-5
25	Interpret transit analysis of phase shift oscillator/Wien bridge oscillator/Colpitts/Hartly Oscillators using Op-amp IC 741 and Transistor	i) Construct the circuit as per circuit diagram in simulation software. ii) Stimulate the constructed circuit. iii) Verify output waveforms and calculate frequency of oscillations.	EIG401-5

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs.

Each student has to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- a) Build the Digital IC tester circuit.
- b) Build 4 bit parity generator and parity checker circuit.
- c) Build a circuit to implement 4-bit adder.
- d) Build a circuit to test 7 segment displays.
- e) Build a circuit for LED flasher.
- f) Design and analyze digital arithmetic circuit.

B) THEORY :

Chapter	Name of the Topic
<i>EIG401-1 Identify and use different application tools of Matlab/Scilab.</i>	
01	Introduction to MATLAB & SIMULINK /SCILAB Environments 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. OR 1.6. Introduction of Scilab Environments 1.7. The Workspace and Working Directory.
<i>EIG401-2 Use and write Matlab/Scilab programs using various function as per requirements.</i>	
02	MATLAB Programming Basics /Scilab as Programming Language 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 OR 2.8 Creating matrices and some simple matrix operations using Scilab 2.9 Sub-matrices using scilab 2.10 Plotting graphs
<i>EIG401-3 Build various models in simulink as per industry requirements</i>	
03	Industrial Applications of MATLAB/Scilab 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
<i>EIG401-4 Identify and use different application tools of OrCAD</i>	
04	Introduction TO OrCAD 4.1 Introduction to OrCAD tools - OrCAD Capture, OrCAD PSpice, OrCAD, Layout 4.2 Features of OrCAD tools
<i>EIG401-5 Design, Simulate and create PCB layout of electronic circuits</i>	
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.
<i>EIG401-5 Design, Simulate and create PCB layout of electronic circuits</i>	
06	OrCAD Pspice 6.1 Different Simulation techniques 6.2 Transient Analysis - Op-amp Circuitry 6.2.1 Bias Point Analysis - Resistive Circuitry 6.2.2 A/C Sweep - Frequency Response 6.2.3 D/C Sweep - Transistor Analysis 6.3 Clean Room Standards. 6.4 Basics of PCB layers. 6.5 Component Routing -Auto Routing & Manual Routing. Post Processing Techniques.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 IV*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

b) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

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

Websites

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

COURSE ID:

Course Name : EMBEDDED SYSTEM
Course Code : EIG402
Course Abbreviation : GEMS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIG309

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	50E	150

* E-External Assessment *Assessment at semester end practical exam as per Pro-forma III.

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 and maintain 8051 microcontroller based embedded systems

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:

EIG402-1 Classify, Define and State the functions of Embedded system

EIG402-2 Apply Embedded C programming

EIG402-3 Develop timer and interrupts based applications for 8051 microcontroller

EIG402-4 Interface and Program various I/O devices with 8051 microcontroller

EIG402-5 Interpret features of Real Time Operating 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Design, implement and maintain 8051 microcontroller based embedded systems	1	3	3	1	-	-	-	3	3
EIG402-1	1	1	2	-	-	-	-	2	2
EIG402-2	1	3	2	-	-	-	-	2	2
EIG402-3	-	3	3	1	-	-	-	2	2
EIG402-4	1	2	3	1	-	-	-	3	3
EIG402-5	1	2	-	-	-	-	-	3	3

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.

CONTENT:

A) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10/20 out of 15/25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1)	Identify the different peripherals and its interfacing with 8051 microcontroller know how on the Development board available in the laboratory	5) Identify different peripherals 6) Trace the interfacing of all the on board peripherals with 8051 microcontroller	EIG402-1
2)	Use Keil Compiler's integrated Development Environment (IDE) for developing embedded C programs	7) Writing programs using Embedded C for 8051	EIG402-2

3)	Development and execution of the program in C for sending data on port lines. 1) Sending ASCII characters/numbers to a particular port 2) LED Blinking continuously 3) LED state control by push button switch 4) Get status of a pin and output it on another pin	8) Writing programs using Embedded C for 8051 9) Programming using 8051 kit/ any standard compiler like KEIL	EIG402-2, 3
4)	Development and execution of the program in C for arithmetic operation and time delay 1) LED Blinking for 500 times 2) Toggle all the bits of a port with a 250 msec delay in between 3) Sounding a buzzer connected to a port pin upon door sensor sense the open condition	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG402-2, 3
5)	Development and execution of the program in C to display numbers from 0 to 9 on 7 segment display interfaced with 8051 with a delay in between	4) Writing programs using Embedded C for 8051 5) Programming using 8051 kit/ any standard compiler like KEIL 6) Perform calculations	EIG402-2, 3
6)	Development and execution of the program in C for logical operations and data conversion 1) Convert packed BCD to ASCII 2) Convert ASCII digits to packed BCD 3) Calculation of checksum byte 4) Data integrity check using checksum byte 5) Convert binary to decimal and display the digits on ports	3) Writing programs using Embedded C for 8051 4) Programming using 8051 kit/ any standard compiler like KEIL 5) Perform calculations	EIG402-2, 3
7)	Development and execution of the program in C to generate square wave at a port pin 1) Generate square wave at a port pin P0.1 of any frequency using time delay generated using for loop 2) Generate square wave at a port pin P0.1 of a particular frequency using time delay generated using for loop	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG402-3
8)	Development and execution of the program in C for Timers and Counters of 8051 1) Generate square wave at a port pin P1.1 of a particular frequency using Timer 0 2) Employ Counter 0/Counter 1 for	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG402- 3

	counting the events outside 8051 and are being inputted at T0/T1 pin Count		
9)	Development and execution of the program in C for 4X4 matrix Keyboard interfaced with 8051	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL	EIG402- 4
10)	Development and execution of the program in C to display certain message on LCD interfaced with 8051 1) Display message “Electronics Department” on LCD using time delay method or Busy Flag method	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG 402- 4
11)	Development and execution of the program in C to send data on serial port continuously	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG402- 4
12)	Development and execution of the program in C to rotate the stepper motor interfaced with 8051 in clockwise/ anticlockwise direction	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG402- 4
13)	Development and execution of the program in C to speed control of DC motor interfaced with 8051 using PWM	4) Writing programs using Embedded C for 8051 5) Programming using 8051 kit/ any standard compiler like KEIL 6) Perform calculations	EIG402- 4
14)	Development and execution of the program in C to display digital equivalent of analog input to ADC0808/0809 interfaced with 8051	1) Writing programs using Embedded C for 8051 2) Programming using 8051 kit/ any standard compiler like KEIL 3) Perform calculations	EIG402- 4
15)	Development and execution of the program in C to generate analog waveforms like- sine. Step ramp, triangular at the output of DAC0808/0809 interfaced with 8051	4) Writing programs using Embedded C for 8051 5) Programming using 8051 kit/ any standard compiler like KEIL 6) Perform calculations	EIG402- 4

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- Prepare a chart of various features using data sheets of 8051, PIC, AVR, ARM
- Prepare a chart of various features an operations of temperatutre sensors. Devices using data sheets
- Prepare a chart of various types of LCDs to display its features, pin functions and steps of operations using data sheets
- Draw the circuit diagram of minimum system configuration based on 8051 micocontroller and implement it
- Draw interfacing diagram of connecting Relay with 8051 on development board and write program to turn it ON/OFF
- Draw interfacing diagram of connecting Buzzer with 8051 on development board and write program to turn it ON
- Build an application of flashing display to flash advertisement
- Build a system to display department name with rolling display
- Build two digit counter system
- Build a class period bell system as per the given time table with 7 teaching periods of 1 hour each
- Build a temperature monitoring system to maintain the given temperature
- Build automated door control system to open and close the door
- Build a pollution monitoring system to observe the level of CO₂
- Build a traffic light controller for traffic signals as per specified delay
- Build a water level controller for given water levels

B)THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>EIG402-1 Classify, Define and State the functions of Embedded system</i>			
1	Introduction to Embedded System 1.1 Embedded system 1.1.1 Block diagram of Embedded system 1.1.2 Embedded system functions and characteristics 1.1.3 Classification of Embedded systems 1.1.3.1 Small scale, medium scale, large scale 1.1.3.2 Sophiscated, standalone	5	10

	1.1.3.3 Reactive/Real time (Soft and Hard) 1.1.4 Embedded system- life cycle 1.1.5 Steps in design and development of embedded system 1.2 Microcontroller architectures 1.2.1 Harvard and Von-Neumann architecture 1.2.2 RISC and CISC architecture 1.3 Applications of - 8051, PIC, AVR and ARM microcontrollers in embedded systems		
<i>EIG402-2 Apply Embedded C programming</i>			
2	Programming 8051 in Embedded C 2.1 Overview of 8051 architecture 2.2 Data types and time delay 2.3 I/O programming 2.4 Logic operations 2.5 Data conversion programs 2.6 Accessing code ROM space 2.7 Data serialization	7	12

<i>EIG402-3 Develop timer and interrupts based applications for 8051 micrcontroller</i>			
3	8051 Timers, Serial port and Interrupts programming in Embedded C 3.1 Programming 8051 timers (Mode 0,1,2) 3.1.1 Generation of time delay using timer 3.1.2 Square wave generation at port pin of various duty cycle 3.1.3 Counter programming 3.2 Serial port programming 3.2.1 RS232 serial communication standard 3.2.2 MAX232 3.2.3 Serial communication protocols 3.2.4 I ² C, CAN, USB, SPI and SSP 3.3 Interrupts Programming 3.3.1 Programming of timer interrupts 3.3.2 Programming of Serial communication interrupts 3.3.3 Programming of External hardware interrupts	12	18

	Sub-total	24	40
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Section II

Sr. No.	Topics	Teaching hours	Marks
<i>EIG402-4 Interface and Program various I/O devices with 8051 microcontroller</i>			
4.	Interfacing & programming Input and Output devices 4.1 LED, Switch, Relay Interfacing and programming 4.2 LCD interfacing and programming 4.3 Keyboard interfacing and programming 4.4 ADC0808/0809 and MAX1112 interfacing and programming 4.5 DAC0808 interfacing and programming	10	16
<i>EIG402-4 Interface and Program various I/O devices with 8051 microcontroller</i>			
5	Motor control and Real time clock(DS12887) interfacing and programming 5.1 Stepper motor interfacing and programming 5.2 DC motor interfacing and speed control of DC motor using PWM 5.3 DS12887 RTC interfacing and its programming in C, alarm, SQW and IRQ features 5.4 Temperature sensor(LM35) interfacing and signal conditioning and program to read and display temperature reading	10	16
<i>EIG402-5 Interpret features of Real Time Operating System</i>			
6.	Introduction to Real Time Operating System (RTOS) 6.2 Operating System: General and Real time 6.3 Characteristics of Real Time Operating System: Consistency, Reliability, Scalability, Performance, Predictability 6.4 Functions of RTOS: Task Management, Scheduling, Resource allocation 6.5 Features of RTOS: Watchdog Timer, semaphore 6.6 Deadlock: Reason of occurrence, Deadlock detection prevention and ignoring	4	8
	Sub total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Introduction to Embedded System	02	04	04	EIG402-1	10
2	Programming 8051 in Embedded C	02	04	06	EIG402-2	12
3	8051 Timers, Serial port and Interrupts programming in Embedded C	02	06	10	EIG402-3	18
4	Interfacing & programming Input and Output devices	02	06	08	EIG402-4	16
5	Motor control and Real time clock(DS12887) interfacing and programming	02	06	08	EIG402-4	16
6	Introduction to Real Time Operating System (RTOS)	02	02	04	EIG402-5	08
	Total >>	12	28	40		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 III*

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma III.*

b) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk and Board
2. Video Clips
3. PPTs
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, Latest Edition
2.	M.A.Mazidi, Janice, Gelispe and Mckinlay, Roline D.	The 8051 Microcontroller and Embedded systems	Pearson Edition, Prentice Hall, Latest Edition
3.	Ajay Deshmukh	Microcontrollers(Theory & Applications)	Tata Mcgraw Hill, Latest Edition

b) Websites

- a) Simulation software:- www.keil.com
- b) <https://exploreembedded.com/wiki/>
- c) <https://www.arduino.cc/>
- d) <https://scilab-arduino.fossee.in>
- e) Microcontroller course available on www.nptel.ac.in
- f) Real time system course videos available on www.nptel.ac.in
- g) Search 'RTOS' on YouTube

* * *

COURSE ID :

Course Name : ELECTRONICS CIRCUIT DESIGN
Course Code : EIG 403
Course Abbreviation : GECD

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		Total
	Theory	Practical	Theory	Practical */Micro-project	
Detailsof Evaluation	Average of two tests of 20 marks each to be converted out of 10 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End oral / Micro-project Exam (3 hours)	
Marks	20	--	80	50E	150

** Assessment as per Pro-forma III.

III- Internal and external 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. Diploma engineers are able to design a circuits as per applications. 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) Diagnose iv) Analyze v) Formulate

COURSE OUTCOMES:

EIG 403-1 Identify specification of different electronics component.

EIG 403-2 Use power supply as per requirement.

EIG 403-3 Design small signal amplifier.

EIG 403-4 Differentiate and sketch power amplifier.

EIG 403-5 Classify and formulate oscillators as per frequency requirement.

EIG 403-6 Distinguish and select 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Design electronic circuit for different engineering applications	1	1	1	1	-	-	-	3	3
EIG 403-1	1	1	-	-	-	-	-	1	1
EIG 403-2	2	1	2	1	-	-	-	3	3
EIG 403-3	2	1	2	1	-	-	-	3	2
EIG 403-4	2	1	2	1	-	-	-	2	2
EIG 403-5	2	1	2	1	-	-	-	3	2
EIG 403-6	2	2	-	1	-	-	-	3	2

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.

CONTENT:

C) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 'X' experiments).

Sr.no	Laboratory experiments	Skills Developed	Course Outcomes
1	Study of colour coding of resistor, capacitor, inductor and specification of diode ,BJT ,	1.Identify components. 2.Understand specification of component.	EIG 403-1

	FET, OPAMP		
2	Full wave rectifier design with filter with given specifications.	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-2
3	Design of zener regulator with given specifications.	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-2
4	Design of transistorised series regulator with given specifications.	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-2
5	Design of IC 723 regulator. Low Voltage	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-2
6	Design of IC 723 regulator. High voltage	1. Execute calculations. 2. Choose components. 3. Design circuit and test it on breadboard	EIG 403-2
7	Design of small signal common emitter voltage amplifier.	1. Execute calculations. 2. Choose components. 3. Design circuit and test it on breadboard	EIG 403-3
9	Design of small signal emitter follower voltage amplifier.	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-3
10	Design of class A power amplifier with resistive load.	1. Execute calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-4
11	Design class AB complementary symmetry power amplifier and test it	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-4
12	Design of RC oscillator	1. Execute calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-5

13	Design of LC oscillator	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-5
14	Design of Astable multivibrator.	1. Perform calculations. 2. Select components. 3. Design circuit and test it on breadboard	EIG 403-6
15	Design of Monostable multivibrator.	1. Execute calculations. 2. Choose components. 3. Plan circuit and test it on breadboard	EIG 403-6

A.2 Micro-project

Each student should be allotted one microproject in the beginning of the semester. In 2nd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student has to maintain a dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- a) Build a burglar alarm circuit.
- b) Construct one bit counter.
- c) Develop touch sensor.
- d) Construct water level indicator.
- e) Build rain alarm,
- f) Develop street light control.
- g) Construct dancing led.
- h) Build clamp sensor
- i) Develop batch counter.
- j) Construct mobile detector

D) THEORY :

SECTION I

Sr. No.	TOPIC/ SUB TOPIC	Teaching (Hours)	Theory evaluation Marks
<i>EIG 403 -1 Identify specification of different electronics component</i>			
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(Exaplain Hybrid parameters of Transistor) 1.5 Field Effect Transistor 1.6 Unipolar Junction Transistor (NUMERICAL BASED ON ABOVE TOPIC)	04	08
<i>EIG 403 -2 Use power supply as per requirement</i>			
02	Design of Power Supply 2.1 Design of Center-tapped rectifier with PI(CLC) filter. 2.2 Design of Bridge rectifier with PI(CLC) filter. 2.3 Design of Zener shunt regulator. 2.4 Design of Transistor series regulator(Emitter follower) 2.5 Design of IC 723 low and high voltage regulator 2.6 Design of Three terminal regulator-78xx and 79xx. (NUMERICAL BASED ON ABOVE TOPIC)	10	16
<i>EIG 403 - 3 Design small signal amplifier.</i>			
3	Design of small signal amplifier. 1.1 Design of small signal voltage amplifier (CE) 3.2Design of Emitter follower, Bootstrapped Emitter follower. 3.3Types of coupling in multistage amplifiers-Direct Coupling and RC coupling 1.4 Design of two stage R-C coupled amplifier 1.5 Design of Common-source amplifier	10	16

	1.6 Design of source follower. (NUMERICAL BASED ON ABOVE TOPIC)		
	TOTAL:	24	40

Section II

<i>EIG 403 - 4 Differentiate and sketch power amplifier</i>			
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
<i>EIG 403 - 5 Classify and formulate oscillators as per frequency requirement</i>			
5	Design of Oscillators 5.1 Barkhausen'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 BJT and Op-amp 5.3 Design of Hartley oscillator using BJT and Op-amp	10	16
<i>EIG 403 -6 Distinguish and select multivibrator</i>			

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	EIG 403-1	08
2.	Design of power Supply	04	04	08	EIG 403-2	16
3.	Design of small signal amplifier	04	04	08	EIG 403-3	16
4.	Power Amplifier design	02	02	08	EIG 403-4	12
5.	Design of Oscillators	04	04	08	EIG 403- 5	16
6.	Design of Multivibrators	02	02	08	EIG 403-6	12
				Total		80

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

k) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/ Logic/ Program/Result	05
Affective	Discipline and punctuality	05

	Procedure/Safety Measures/Decency/Presentation	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 III*,

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

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma III.*

1) Assessment Criteria for Term-end Practical Examination:

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	Technical ability	10
2	Correct figures / diagrams/ Logic	10
3	Observation table/Algorithm/flowchart/Program	10
4	Correctness of - Result / Output/ Calculations / Graphs	10
5	Safety / Use of proper tools / overall Decency &Presentation/ Workmanship	10
	Total	50

**Assessmeat semester end practical exam as per Pro-forma III.*

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. PPTs 4. Question 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

COURSE ID:

Course Name : Project-1
Course Code : EIG 404
Course Abbreviation : GPR1

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <nil>

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	0	2
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical *	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical (3 hours)	
Marks	--	--	--	50I	50

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

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. The course of the “Project” is designed with an aim to develop the ability of “learning to Learn” on its own. This subject is essential to understand the implementation of the system development process i.e. analyze, design, coding, debugging and testing. This course also aims to develop the managerial skills such as leadership, coordination, team work, planning the resources, etc. Thus by studying this course, abilities like innovativeness, creativity, imitativeness, performance qualities, etc. are developed in students.

COMPETENCY:

Plan innovative/creative solutions to solve/complete the identified problems/task/shortcomings faced by industry/user w.r.t electronics/ telecommunication engg .

Cognitive: Create/Suggest solution to solve the identified problem.

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

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

vi) punctuality

COURSE OUTCOMES:

EIG 404-1 Write the problem/task specification in existing systems related to the occupation.

EIG 404-2 Select, collect and use required information/knowledge to solve the problem/complete the task.

EIG 404-3 Choose logically relevant solution.

EIG 404-4 Communicate effectively and confidently as a member and leader of team.

EIG 404-5 Prepare and present project proposals/project/seminar report..

EIG 404-6 Develop sense of environmental responsibility and impact on society.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Plan innovative/creative solutions to solve/complete the identified problems/task/shortcomings	1	3	3	2	2	3	-	3	3
EIG 404-1	-	3	2	-	2	-	-	-	2
EIG 404-2	-	2	3	2	-	1	-	1	2
EIG 404-3	1	2	3	2	2	2	-	2	3
EIG 404-4	1	-	-	-	-	2	-	3	3
EIG 404-5	1	1	2	2	-	1	-	2	2
EIG 404-6	-	2	1	-	2	-	-	-	-

COURSE DETAILS:

Projects are culminating experiences in which students synthesize the competencies acquired over whole programme. In some cases they also integrate cross-disciplinary knowledge.

To develop the highly essential industry oriented skills and competencies in the students, the projects are offered in the last two semesters to serve for following purposes:

i) Integrate the competencies acquired by the students in the previous and current semesters.

ii) Provide opportunity for interdisciplinary work in tackling problems likely to be faced by them in industry which are exciting and challenging.

A) Project Planning:

Students are supposed to find out a suitable project and prepare a detailed plan in fifth semester so that it can be executed smoothly in sixth semester.

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 projects will have a detailed project proposal, which must be executed or implemented within the time allocated, simultaneously maintaining a project diary periodically monitored by the teacher. A detailed project report is to be prepared as project progresses, which has to be submitted after the project is over. Project diary will be assessed by teacher.

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.

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.

B) Scopes of Projects

Scope of the project work should be decided based on following criteria:

- a) **Relation to diploma programme curriculum:** When students intend to select topics for the project work they need to choose a project which relates well to their curriculum (It may be beyond curriculum, but it should relate to it) and requires implementation of theories already learnt and skills already possessed by them from the previous semesters.
- b) **Abilities possessed by the group of students:** Projects should be chosen so that it can be completed mainly using students' problem solving capabilities and depth of learning. It is natural that highly motivated students or high achievers may come out with projects which are more complex and challenging. Teachers should guide students to choose challenging projects according to the students' ability.
- c) **Resources Available:** Students and Guides should keep in mind the availability of resources while deciding the topic and the scope of the project. Some of the

important resources which need consideration are:

- Time available
- Raw Material/Components required
- Manufacturing/Fabrication equipment and tools required
- Testing/Measuring equipment and instruments required
- Access to Journals (Library/Digital)
- Expertise for theoretical guidance (available in polytechnic, nearby institutes or nearby industries)
- Expertise and technology required for fabrication (if required) v u l . Software required.

C) GUIDELINES FOR GROUP FORMATION:

The project work should be undertaken by group of maximum 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.

D) GUIDELINES FOR UNDERTAKING THE PROJECT:

(i) Selection of project title: The selection of the Project title must have emphasis to attain with respect to CO's , PO's and PSO's of the programme. The students will then work on the identified problem/task through a rigorous process of understanding and analyzing the problem, conducting a literature search, deriving and discussing under the supervision of project guide. The project team will prepare the Project Proposal with the following sub-titles:

- a) Rationale (one page)
- b) Introduction
- c) Literature Survey
- d) Problem Definition
- e) Proposed Methodology of solving Identified problem
- f) Resources and consumables required.
- g) Action Plan (sequential list of activities with probable dates of completion)

Project Idea shall be approved by the teacher and HOD. The student will begin to maintain a dated Project Diary comprising of 15-20 pages for the whole semester. This diary should be assessed by teacher timely.

(ii) Activities to be carried out in the entire semester:

Project activity calendar should be prepared by project co-ordinator and should be displayed to students w.r.t following points.

Students are advised to plan their project work w.r.t following stages

Stage	Major Learning Activities	Description of Activity
STAGE-1 Orientation	Appreciate objectives of learning this course	Orientation of students w.r.t following points 1.1 Introduction. 1.2 Need, importance and objectives. 1.3 Examples of projects. 1.4 Expected benefits.
STAGE-2 Searching	a) Interact with the industry/research organization personnel. b) Gather information and organize	2.1 Information gathering through websites and media. 2.2 Identification of Industry/research organization 2.3 Visiting Industry/research organization 2.4 Creating awareness about the industrial premises , personnel , processes and products 2.5 Review of literature
STAGE-3 Problem Definition & Project Proposal Submission	a) Define & explain Problem definition b) Prepare & submit project proposal and synopsis.	3.1 Identification of problem/ project. Each student will suggest one problems/ projects. 3.2 Defining problem in consultation with institute guide & industry mentor. While defining project title/problem ,it should also be: i) Preferably innovative in nature. ii. Feasible using the infrastructure of the institute. Iii) Having measurable and analytical end results. 3.3 After finalization of project title project proposal should be submitted in the prescribed format provided by guide/department.
STAGE-4 Design Solution	a) Draw General block diagram of solution. b) Develop circuit diagram in detail. c) Write algorithm and draw flowchart	4.1 Block Diagram of project 4.2 Draw & Develop circuit diagram using circuit design softwares/tools 4.3 Development of algorithm and flowchart if applicable
STAGE – 5 Hardware/software simulation and partial Implementation	a) Design PCB Layout b) Simulate circuit c) Assemble circuit d) Test the Hardware circuit Troubleshoot the hardware circuit.	5.1 PCB Layout preparation using software tools 5.2 Circuit simulation 5.3 Partial implementation using Breadboard or General purpose PCB 5.4 Test and troubleshoot hardware if applicable.
STAGE – 6 Documentation and presentation	a) Prepare project report. b) Prepare PPT presentation Present project work	6.1 Prepare project report as per prescribed format given by department/guide. 6.2 Prepare PPT and present as per schedule.

(iii) Synopsis format:

The synopsis report should include following points:

- Title of project
- Introduction: Study of existing system
- Feasibility Study
- Objective and Scope
- Block diagram and description
- Hardware and software requirements
- Action Plan/ Expected schedule (sequential list of activities with probable dates of completion)
- Expected outcomes/result
- Approximate Expenditure
- References.

(iv) Project planning report/Seminar report:

At the end of fifth Semester, the student will prepare a Semester V ,Project Planning Report/Seminar report with the following sub-titles:

1. Cover Page & Title Page
2. Certificate
3. Acknowledgements
4. Table of Contents
5. Introduction
6. Literature Reviews
7. Proposed Work:
 - Problem Definition/Objective and Scope of Project
 - Block diagram/Design and description
 - Circuit Diagram(Draft circuit) and working, if finalized can develop PCB Design
 - Hardware Requirements:-Should contain description and specifications of major components used
 - Software Requirements:- Should list features of software used.
 - Expected outcome Result
 - Project Milestones Achieved(Schedule of proposed date and actual date of achievement)
- 8 Future scope of work
- 9 Conclusion
- 10 Appendix- *if any(programs, data sheets, derivations, etc)*
- 11 References

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Problem Identification/Project title.	10
	Industry Survey and literature review	
Psychomotor	Hardware/Software Designing	

	Project diary ,Report Writing and documentation	10
Affective	Punctuality and overall contribution	05
	Decency and presentation	
TOTAL		25

ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted in the form of demonstration of work done per criteria given

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

Sr. No.	Criteria	Marks allotted
1	Problem Identification/Project title./Project synopsis	05
2	Industry Survey and literature review	05
3	Methodology adopted/Designing of Hardware/Software	05
4	Project diary and documentation	05
5	Presentation, Question and Answer	05
	Total	25

**Final marks of PST shall be awarded as per Assessment Pro-forma II*

b) Term-end Oral Examination :

A seminar should be delivered by group of students on the selected project topic in front of teachers and students in their class.

Every student shall be assessed by internal examiner as per the following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Project synopsis	10
Psychomotor	Execution of plan in 5 th semester	10
	Seminar Report and documention	10
Affective	Punctuality and overall contribution	10
	Presentation, Question and answer	10
TOTAL		50

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:

- a. www.efy.com
- b. www.electronicshub.org
- c. www.datasheet.com
- d. <http://www.electronicshub.org>
- e. <http://www.engineersgarage.org>
- f. <http://www.electronics-project-design.com>
- g. <http://www.eleccircuit.com>
- h. <http://www.circuit-projects.com>
- i. <http://www.electronicproject.org>
- j. <http://www.circuiteasy.com>
- k. <http://www.electronics-project-design.com>
- l. <http://www.electronicsschematic.com>

c) Magazines:

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

Performa P-1
PROJECT SHEET/PROJECT PROPOSAL
(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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
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.				

Detailed Planning of Project Work :

S N	Activity	Details	Date of completion
1.	Finalization of students' groups and assignment of project guide (Performa P-2)	Policy to be decided by programme department	
2.	Identification and finalization of topic (Performa P-1)	<ul style="list-style-type: none">• 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-3)	<ul style="list-style-type: none">• 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-4)	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 PowerPoint presentation (Performa P-6 & P-5)	<ul style="list-style-type: none">• 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

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

Prograamme :
Date :

Academic Year :

Class :

S N	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.						
...						

GOVERNMENT POLYTECHNIC, KOLHAPUR
(An Autonomous Institute of Government of Maharashtra)

Performa P-3
ASSESSMENT RUBRICS FOR SYNOPSIS OF PROJECT

Programme :
Title of Project :

Academic Year :

Project Group ID :

Name of Project Guide :

Date :

S N	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 >>													

Project Guide

Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Performa P-4 ASSESSMENT RUBRICS FOR DEMONSTRATION-1/2 OF PROJECT

Programme : Academic Year : Title
of Project :

Project Group ID : Name of Project Guide : Date :

S N	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 >>													

Project Guide

Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Performa P-5 ASSESSMENT RUBRICS FOR SEMINAR REPORT OF PROJECT

Programme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide :

Date :

S N	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 >>													

Project Guide

Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Performa P-6 ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECT

Programme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide :

Date :

S N	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 >>													

Project Guide

Programme Dean

COURSE ID:

Course Name : Power Electronics 1
Course Code : EIG 405
Course Abbreviation : GPR1

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <nil>

Teaching Scheme:

COURSE ID :
COURSE NAME : POWER ELECTRONICS I
Course Code : IEG 405
Course Abbreviation : GPE1

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

	Hours / week	Credits
Theory	03	05
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical */Micro-project	
Detailsof Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End oral / Micro-project Exam (3 hours)	
Marks	20	--	80	50I	150

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

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. 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:

IEG 405-1 Understand electronic semiconductor switches from thyristor family.

IEG 405-2 Describe different turn on methods of thyristor.

IEG 405-3 State commutation methods of thyristor.

IEG 405-4 Analyze Series and parallel connection of SCR

IEG 405-5 Acquire knowledge of uncontrolled rectifier circuit .

IEG 405-6 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Acquire knowledge about various electronic semiconductor switches from thyristor family & using them designing some power control circuits.	2	2	1	--	--	--	--	1	1
IEG 405-1	2	-	1	--	--	--	--	1	1
IEG 405-2	1	2	1	--	--	--	--	1	--
IEG 405-3	1	2	1	--	--	--	--	2	--
IEG 405-4	1	2	1	--	--	--	--	1	--
IEG 405 -5	1	2	1	--	--	--	--	1	--

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
IEG 405 -6	--	3	1	--	--	--	--	2	2

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.

E) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 'X' experiments).

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	IEG 405-1
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	IEG 405-1
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	IEG 405-1
4.	R –firing circuits	1. Draw Circuit Diagram And Waveform. 2. Change firing angle and observe output.	IEG 405-2
5.	RC- Firing circuits	1. Draw Circuit Diagram And Waveform. 2. Change firing angle and observe output	IEG 405-2
6.	UJT Firing circuits	1. Draw Circuit Diagram And Waveform. 2. Change firing angle and observe output	IEG 405-2
7.	PUT Firing circuits	1. Draw Circuit Diagram And Waveform. 2. Change firing angle and observe	IEG 405-2

		output	
8.	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	IEG 405-2
9.	Flasher using SCR.	1. To study the flasher circuit.	IEG 405-2, IEG 405-3
10.	To study the characteristics of PUT.	1. To understand and study the characteristic and diff. points in it.	IEG 405-1
11.	To study the SCR commutation circuits(Class A,B,C)	1. To learn resonant turn off, using auxiliary SCR	IEG 405-3
12.	To study the SCR commutation circuits(Class D,E,F)	1. To learn auxiliary SCR, coupled pulse turn off, natural turn off	IEG 405-3
13.	To study Half wave controlled rectifier with R load ,RL load and free wheeling diode.	1. Draw Circuit Diagram And Waveform.	IEG 405-6
14.	To study Full wave controlled rectifier with R load ,RL load and free wheeling diode	1. Draw Circuit Diagram And Waveform.	IEG 405-6
15.	To study full controlled rectifier	1. Draw Circuit Diagram And Waveform	IEG 405-6

A.2 Micro-project

Each student should allotted one micro project in the beginning of the semester. In 2nd and 4th semester the micro projects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each micro project should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the micro project work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of micro projects is as follows:

- UJT firing circuit.
- Fan speed control using TRIAC and DIAC
- Light dimmer.
- SCR flasher.
- Battery charger circuit using SCR.
- Automatic hand sanitizer.
- Home security system
- Solar power generator system
- Thyristor power control by IR remote.
- Speed control of stepper and DC motor.

C) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEG 405-1 Understand 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. 1.3.4 LASCR 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.	12	18
IEG 405-2 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.	08	12

	R- Firing circuits RC- Firing circuits 2.4 UJT relaxation oscillator: 2.4.1 Circuit , operating principle 2.4.2 expression for time period , Maximum & minimum value of timing resistor 2.4.3 Waveforms. 2.5 PUT relaxation oscillator: 2.5.1 Circuit , operating principle 2.5.2 expression for time period , waveforms 2.6 Advantage of PUT over UJT. 2.7 Triac triggering using Diac.		
<i>IEG 405-3 State commutation methods of thyristor.</i>			
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	04	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.			

Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)
IEG 405-4 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	06	12
IEG 405-5 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 3 ϕ 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 parameters 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	6	12
IEG 405-6 Identify Controlled rectifier circuit.			
6	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 resistive load circuit, Operating principle ,	12	16

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

Section / Topic no.	Name of topic	Distribution of marks			Course outcome	Total marks
		Knowledge	Comprehension	Application		
I/1	Semiconductor switches	5	5	8	IEG 405-1	18
I/2	Triggering methods of thyristor	4	3	5	IEG 405-2	12
I/3	Commutation circuits	3	3	4	IEG 405-3	10
II/4	Series and parallel connection of SCR	4	3	5	IEG 405-4	12
II/6	AC to DC converter-	4	3	5	IEG 405-5	12

	uncontrolled rectifier					
II/7	AC to DC converter-controlled rectifier	5	5	6	IEG 405-6	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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

c) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/ Logic/ Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/Safety Measures/Decency/Presentation	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 IV*

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/Algoritn/Flowchart/Program	05
2	Observations, Result, Output	05
3	Sample Calculations with relevant formulae	05
4	Proper Graphs & Procedure / workmanship and Safety measures	05

5	Oral Based on Term Work	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

d) **Assessment Criteria for Term-end Practical Examination:**

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	Technical ability	10
2	Correct figures / diagrams/ Logic	10
3	Observation table/Algorithm/flowchart/Program	10
4	Correctness of - Result / Output/ Calculations / Graphs	10
5	Safety / Use of proper tools / overall Decency &Presentation/ Workmanship	10
	Total	50

**Assessment at semester end practical exam as 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.PPTs 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
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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 : PRINCIPLES OF CONTROL SYSTEM
Course Code : EIG 406
Course Abbreviation : GPCS

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		Total
	Theory	Practical	Theory	Practical */ Micro-project	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical & Micro-project Exam (3 hours)	
Marks	20	--	80	25 I	125

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

RATIONALE:

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. 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 :

EIG 406-1.Identify various types of control systems

EIG 406-2 Predict transient and steady state responses of system.

EIG 406-3.Draw frequency response of system using bode plot

EIG 406-4Determine stability conditions of control system.

EIG 406-5..Identify use of servo motors as per requirement.

EIG 406-6: 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency : Apply control systems in real time.	3	-	-	2	3	1	3	3	2
EIG 406-1	2	-	-	1	-	-	2	1	1
EIG 406-2	3	-	-	1	-	-	-	2	-
EIG 406-3	3	-	-	2	-	-	-	-	-
EIG 406-4	3	-	-	-	2	-	2	1	1
EIG 406-5	3	-	-	1	2	1	2	1	1
EIG 406-6	3	-	-	1	2	1	3	2	2

CONTENT:

A.1 Suggested Practical's/ Exercise

Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 experiments)..

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 406-5
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 406-5

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 406-5
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 406-5
5	Step response of first order R-C circuit	1. Build first order RC Circuit on bread board. 2. Observe the output for step input 3. Plot the step response on graph.	EIF 406-2
6	Step response of R-L-C second order circuit	1. Build second order RLC Circuit on bread board. 2. Observe the output for step input 3. Plot the step response on graph.	EIF 406-2
7	Temperature controller with on-off controller	1. Analyze temperature controller with on-off controller. 2. Observe output for various set points.	EIF 406-6
8	Temperature controller with PI controller	1. Analyze temperature controller with PI controller. 2. Observe output for various set points.	EIF 406-6
9	Temperature controller with PID controller.	1. Analyze temperature controller with PID controller 2. Observe output for various set points.	EIF 406-6
10	Temperature controller with PD controller	1. Analyze temperature controller with PD controller. 2. Observe output for various set points	EIF 406-6
11	Bode Plot	1. Understand procedure to draw bode plot. 2. Using Matlab software, sketch bode plot. 3. Verify theoretical and practical graph and parameters such as GM, PM.	EIF 406-3
12	Root Locus	1. Understand procedure to draw root locus. 2. Using Matlab software, sketch root locus.	EIF 406-4
13	Step response of first order R-C circuit using simulation software	1. Build first order RC Circuit using Matlab software 2. Observe the output for step input	EIF 406-2
14	Step response of R-L-C second order circuit using simulation	1. Build second order RLC Circuit using Matlab software 2. Observe the output for step input	EIF 406-2

	software		
15	Temperature controller with on-off controller using simulation software	1. Build using Temperature controller with on-off controller Matlab software 2. Observe the output for step input	EIF 406-6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 2nd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of micro projects is as follows:

- Prepare a chart of block diagram reduction rules.
- Prepare a power point presentation of Routh's stability criteria and present it in classroom.
- Build and test step response of RC circuit in matlab.
- Build and test step response of RLC circuit in matlab.
- Construct and test potentiometer as an error detector.
- Draw root locus for a given system's transfer function and explain it in classroom.
- Draw Bode Plot for a given system's transfer function and explain it in classroom.
- Build and test PI controller in matlab.
- Build and test PD controller in matlab.
- Build and test PID controller in matlab.

B. THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG 406-1: Identify various types of control systems.			
1	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	10	14

	<p>standard equation, practical examples.</p> <p>1.7 Linear time varying and time in varying systems – definition and example</p> <p>1.8 Developing differential equations of R-C and RLC electric circuits-simple numerical for finding transfer function of electrical network</p> <p>1.9 Block diagram representation of a system- need, reduction rules, numericals associated with it (only SISO).</p>		
<i>EIG 406-2 :Predict transient and steady state responses of system.</i>			
2.	<p>Time Domain Analysis</p> <p>2.1 Time domain and frequency domain analysis-definition</p> <p>2.2 Transient and steady state response, steady state error-definition and equation only.</p> <p>2.3 Standard test inputs - step, ramp, parabolic& impulse. Need of them, significance, and corresponding Laplace representation</p> <p>2.4 Poles, zeros & characteristics equation – definition</p> <p>2.5 Types of feedback control system: type 0 system, type1 system and type2 system-only definition</p> <p>2.6 Analysis of first order control system for unit step input.</p> <p>2.7 Analysis of second order control system for unit step input.</p> <p>2.8 Time response specifications –Definitions and equations (no derivations)</p> <p>Numericals on Poles,zeros,characteristic equation and time response specification</p>	06	14
<i>EIF 406-3: Draw frequency response of system using bode plot.</i>			
3	<p>Frequency domain Analysis</p> <p>3.1 Introduction, advantages & disadvantages of frequency response analysis</p> <p>3.2 Frequency response specifications-definitions</p> <p>3.3 Correlation between time and frequency domain specifications,</p> <p>3.4 Bode plot-introduction,</p> <p>3.4.1. General procedure for constructing Bode plot</p> <p>3.4.2 Plotting gain margin & phase margin</p> <p>3.4.3 Simple numerical (max. up to 2-poles)</p>	08	12
	Sub Total	24	40

Section-II

Sr. No.	Topics	Teaching hours	Marks
<i>EIG 406-3: Draw frequency response of system using bode plot.</i>			
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.	07	14
<i>EIG 406-5: Identify use of servo motors as per requirement.</i>			
5	Servo Systems 5.1 Servo system –definition, block diagram, 5.2 AC & DC servo systems- Block diagram 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 5.4 DC servo motor- characteristics, difference from a normal DC motor, comparison between armature controlled and field controlled DC servo motors(with Transfer Function) 5.5 AC servo motor- characteristic of AC Servo motor (no Transfer Function)	10	14
<i>EIG 406-6: Select appropriate Control system processes as necessary.</i>			
6.	Control actions & process controllers 6.1 Process control system – block diagram , elements 6.2 Control actions: discontinuous & continuous modes 6.3 On off controllers: neutral zone 6.4 Concepts of Proportional controllers (offset, proportional band) Integral controllers & Derivative controllers 6.5 Composite controllers:PI, PD, PID controllers 6.6 All Control actions of electronic controllers with circuits & equations (with op amp)	07	12
	Sub Total	24	40
	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
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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	EIG 406-1	14
2	Time domain Analysis of a system	2	4	8	EIG 406-2	14
3	Frequency domain Analysis	2	4	6	EIG 406-3	12
4	Stability	2	4	8	EIG 406-4	14
5	Servo Systems	2	6	6	EIG 406-5	14
6	Control actions & process controllers	4	4	4	EIG 406-6	12
	Total	16	26	38		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 on

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

e) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/ Algorithm/ flowchart	05
	Observation/ Logic/ Program/ Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	05
TOTAL		25

ii) Progressive Skill Test:

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

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

f) Assessment Criteria for Term-end Practical Examination:

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	Technical ability	10
2	Correct figures / diagrams/ Logic	10
3	Observation table/ Algorithm/ flowchart/ Program	10
4	Correctness of - Result / Output / Calculations / Graphs	10
5	Safety / Use of proper tools / overall Decency & Presentation / Workmanship	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

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

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3.PPT 4. Item Bank

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	J.J.Nagrath& M. Gopal	Control system Engg.	Tata McGraw-Hill
2.	K. Ogata	Modern control Engg.	Tata McGraw-Hill
3.	A Anand Kumar	Control systems	PHI Learning
4.	R.A.Barapate	Feedback control system	Tech-max

b) Websites

i) www.nptel.ac.in

ii) www.electronics-tutorials.ws

iii) <http://electrical4u.com/controlsystem>

iv) <https://www.youtube.com/watch?v=XMfH2P2Fc6Q>

v) <https://www.youtube.com/watch?v=NUUGOgkOd1A>

vi) <https://www.oreilly.com/library/view/feedback-control-for/9781449362638/ch04.html>

viii) <https://www.mathworks.com/company/newsletters/articles/6-steps-to-an-on-off-controller-using-stateflow.html>

* * *

COURSE ID:

Course Name : Optoelectronics
Course Code : IEG 407
Course Abbreviation : GOPT

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <nil>

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	251	150

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

RATIONALE :

Optoelectronic devices and optoelectronic integrated optics are becoming increasingly important electronic components with industrial, consumer, and defense applications in fields such as high speed communications, solid state lighting, optical imaging, and environmental and biomedical sensing. To design, characterize, and model these devices requires an in-depth knowledge of semiconductor device physics is needed. . Speed being the major advantage of this technology .Day by day optoelectronics is replacing traditional electronics in many fields. The students must understand construction, working principle and specification of these devices so as provide solution to industrial requirements.

COMPETENCY:

Maintain the circuits in optoelectronics devices.

Cognitive: Identify and choose optical sources and detector as per industrial application.

Psychomotor: Operate and maintain optoelectronics devices in industry.

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

COURSE OUTCOMES :

- IEG 407-1:** Identify and interpret parameters and laws of optics
- IEG 407-2:** Select, use and maintain LED circuitry as per requirement in optoelectronics system.
- IEG 407-3:** Operate and maintain LASER based circuitry in optoelectronics system.
- IEG 407-4:** Identify and interpret parameters of photodetector and use photomultiplier, CCD as per requirement
- IEG 407-5:** Operate and maintain photodetectors in optoelectronics systems.
- IEG 407-6:** Identify and use Optocoupler and display devices as per need.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Maintain the circuits in optoelectronics devices.	1	3	3	3	2	-	2	3	3
IEG 407-1	1	1	-	-	-	-	1	2	2
IEG 407-2	1	2	2	2	-	-	2	2	2
IEG 407-3	-	2	2	2	-	-	2	2	2
IEG 407-4	1	3	3	3	2	-	-	3	3
IEG 407-5	-	3	3	3	2	-	-	3	3
IEG 407-6	-	2	2	-	-	-	2	3	3

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.

CONTENT:

D) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 out of 15 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Test the performance of LED	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI/PI characteristics	IEG 407-1/2
2.	Test the performance of IR LED	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI/PI characteristics	IEG 407-1/2
3.	Test the performance of LASER diode	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI/PI characteristics	IEG 407-/3
4.	Test the performance of LDR	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI characteristics w.r.t variation in light intensity	IEG 407-1/2
5.	Test the performance of Photodiode	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI characteristics w.r.t variation in light intensity	IEG 407-1/4
6.	Test the performance of PIN Photodiode	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI characteristics w.r.t variation in light intensity.	IEG 407-5
7.	Test the performance of Avalanche Photodiode	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI characteristics w.r.t variation in light intensity	IEG 407-5
8.	Test the performance of Phototransistor	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI characteristics w.r.t	IEG 407-4

		variation in light intensity	
9.	Test the performance Solar cells	1) Build the circuit as per circuit diagram 2) Record the measured readings in observation table 3) Draw VI characteristics w.r.t variation in light intensity	IEG 407-5
10.	Create analog link using available source and detector in optical fiber trainer	1) Make the connections. 2) Verify transmitted and received data. 3) Note the readings	IEG 407-2.3
11.	Transmit analog data creating analog link in optical fiber trainer	1) Make the connections. 2) Verify transmitted and received data. 3) Note the readings	IEG 407-2.3
12.	Optical time domain Reflectometer	1) Identify the various functions of ODTR 2) Illustrate its operation	IEG 407-4
13.	LED-Displays	1) Identify types of LED-displays 2) Write/Verify their specifications and applications	IEG 407-6
14.	LCD-Displays	1) Identify types of LED-displays 2) Write/Verify their specifications and applications	IEG 407-6
15.	Optocoupler	1) Identify types of Optocoupler 2) Write/Verify their specifications and applications	IEG 407-6

A.2 Micro-project

Each student should be allotted one microproject in the beginning of the semester. In 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs.

Each student has to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

A suggestive list of micro-projects is given here. The concerned faculty could add similar micro-projects. The micro-project can be carried out in the form of case-study, survey, seminar, laboratory based, simulation based or internet based. Report shall be prepared and submitted at the end of semester

- Build small inverter/charger by using solar cell
- Build driving circuitry for LASER for analog/digital data transmission

- c) Automatic street light control system
- d) Long-range Burglar Alarm Using Laser Torch
- e) Infrared Object Counter
- f) Smart Emergency Light
- g) Multipurpose White-LED Light
- h) Sequential Device Control using TV Remote Control
- i) Twilight Lamp Blinker
- j) Versatile LED Display

E) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>IEG 407-1 Identify and interpret parameters and laws of optics</i>			
1	Basic physics of light <ul style="list-style-type: none"> 1.1 Spectrum of light -visible , infrared , ultraviolet, fiber optic band in light spectrum 1.2 The quantum nature of light -Plank's law, Concept of photon 1.3 Basic optical laws – refractive index , 1.4 Reflection ,refraction, polarization, diffraction, scattering of light 1.5 Luminescence and its types 1.6 Light intensity, optical power, radiance intensity, radiance its units, 	04	08
<i>IEG 407-2 Select, use and maintain LED circuitry as per requirement in optoelectronics system.</i>			
2.	Optical sources- 1 <ul style="list-style-type: none"> 2.1 Optical sources and its types 2.2 Natural light sources, 2.3 Incandescent lamps-construction & working, Emission spectra 2.4 Requirements of light sources 2.5 Direct and indirect bandgap semiconductors 2.6 Material used for construction of LED 2.7 Light emitting diodes-Types of LED :- <ul style="list-style-type: none"> a. Heterojunction & Homojunction LED b. Construction ,working, emission spectra of following:- <ul style="list-style-type: none"> • Planar LED, 	10	16

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<ul style="list-style-type: none"> • Dome LED, • Surface emitter LED, • Edge emitter LED • Superluminescent LED <p>2.8 Characteristics of LED</p> <ul style="list-style-type: none"> • Optical output power • Output Spectrum • Modulation Bandwidth • Reliability • Optical source radiance <p>2.9 Infrared LED – ratings ,electrical characteristic, emission spectra</p> <p>2.10 Merits and Demerits of LED's</p> <p>2.11 Applications of LED's</p>		
IEG 407-3 Operate and maintain LASER based circuitry in optoelectronics system.			
3	<p>Optical Sources -2</p> <p>3.1 Basic Principle Of LASER : Absorption , Spontaneous and stimulated emission of radiation, Population inversion</p> <p>3.2 Characteristics of LASER: monochromatic, directional, Coherent light sources.</p> <p>3.3 Materials used for LASER</p> <p>3.4 Types of LASER:-</p> <p>3.5 Fabry-Perot Resonant Cavity- construction and working</p> <p>3.6 Semiconductor Injection laser – Construction, working, electrical characteristics.</p> <p>3.7 Gain guides and index guided laser- construction and working</p> <p>3.8 Quantum Well Lasers- construction and working</p> <p>3.9 Injection laser characteristics</p> <ul style="list-style-type: none"> • Dependence on threshold current • Dynamic response • Frequency chirp • Noise • Reliability <p>3.10 Advantages, Disadvantages and application of LASER</p> <p>3.11 Comparison between LED and LASER</p>	10	16
	Sub-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)
IEG 407-4 Identify and interpret parameters of photodetector and Use photomultiplier, CCD as per requirement			
4	Photodetector – 1 4.1 Photodetector and types of photo detectors. 4.2 Principles of optical or photo detection-Photovoltaic mode, photoconductive mode 4.3 Requirements of an ideal photodetector 4.1 Photo detector characteristics- Quantum Efficiency, Detector Responsivity, Spectral Response Range, Response Time 4.2 Photo resistors – Construction, working principle, Spectral response, electrical characteristics Merits and Demerits of photo resistors. Applications of photo resistors 4.3 Photomultiplier tubes- Construction, working principle, advantages, disadvantages and applications. 4.4 Charge coupled devices(CCD)- Construction, working principle, Advantages, disadvantages and applications 4.5 Noise in photodetector; Dark current, quantum noise 4.6 Optical time domain Reflectometer: Working Principle, Specification and Applications	06	10
IEG 407-5 Operate and maintain photodetectors in optoelectronics systems.			
5	Photo detectors – 2 5.1 Photodiodes – Construction , working , spectral Response , electrical characteristics , Equivalent circuit, Advantages & Disadvantages ,applications 5.2 PIN photodiode - construction , Equivalent circuit working ,spectral response, electrical characteristics, speed of response, Advantages, Disadvantages and applications 5.3 Avalanche photodiode – construction	10	16

	Equivalent. circuit working ,spectral response ,electrical characteristics , Advantages & Disadvantages applications 5.4 Phototransistor and photo-Darlington construction, working ,electrical and optical characteristics, Advantages & Disadvantages ,applications 5.5 Comparison between all photodetector		
IEG 407-6 Identify and use opto—couplers and display devices as per need.			
6	Optical couplers and display devices 6.1 Opto-couplers- 6.1.1 Types of Optocoupler and working <ul style="list-style-type: none"> ▪ Phototransistor Optocoupler ▪ Photo-Darlington Transistor Optocoupler ▪ Photo-TRIAC Optocoupler ▪ Photo-SCR based Optocoupler 6.1.2 Specifications of Optocoupler 6.1.3 Advantages, disadvantages and Applications of opto- couplers 6.2 LED displays – 6.2.1 Types with features -7 Segment display, Dot matrix and OLED 6.2.2 Advantages and disadvantages of LED displays 6.2.3 Specifications and applications of LED displays 6.3 LCD displays – 6.3.1 Types with construction& working –Dynamic scattering type and Field effect 6.3.2 Advantages and disadvantages of LED displays 6.3.3 Specifications and applications 6.4 Comparison of digital displays 6.5 Solar cells – 6.5.1 Construction and working 6.5.2 Equivalent circuit 6.5.3 Electrical characteristics 6.5.4 Advantages and disadvantages 6.5.5 Applications of solar cells	08	14
	Sub-Total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Physics of light	04	04	00	IEG 407-1	08
2	Optical sources -1	04	04	08	IEG 407-2	16
3	Optical sources -2	02	08	06	IEG 407-2	16
4	Photo detectors – 1	04	04	02	IEG 407-4	10
5	Photo detectors -2	04	04	08	IEG 407-5	16
6	Optical couplers and display devices	04	04	06	IEG 407-6	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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

g) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/Decency/ Presentation	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 IV*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05

3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board
2. Video clips
3. PPTs
4. Question Bank
5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	A.K.Ganguly	Optoelectronics Devices and circuits	Alpha Science International Ltd
2.	John Senior	Optical Fiber Communication	PHI Publication
3.	Gerd Keiser	Optical Fiber Communication	TMH Publication
4.	Anusya Kalawar	Optical fiber communication	Techmax Publication
5.	Deboo , Burros	Integrated circuits and semiconductor devices	Tata McGraw Hill

b) Websites

- i <http://www.physicsclassroom.com>
- ii <http://scienceworld.wolfram.com/physics/>
- iii www.nptel.ac.in
- iv <https://circuitglobe.com/>
- v <https://www.electronicshub.org/>
- vi <https://instrumentationtools.com>
- vii <https://www.rp-photonics.com/>
- viii <https://www.elprocus.com/>
- ix <https://www.daenotes.com>

* * *

COURSE ID:

Course Name : ROBOTICS
Course Code : IEG408
Course Abbreviation : GROB

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		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks	(i) 25 marks for each practical (ii) One PST of 25 marks	Theory exam (3hours)	Term End Practical Exam (03 hours)	
Marks	20	----	80	25I	125

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

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:

IEG 506-1 Identify the different robot components, specifications and its construction.

IEG 506-2 Interpret the robot classification, anatomy, motion and its drive system.

IEG 506-3 Understand the gripper mechanism and robot end effectors.

IEG 506-4 Explore the details of various types of sensors in robot.

IEG 506-5 Explore the role of robots in different applications.

IEG 506-6 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Maintain microcontroller based equipments/system.:	1	3	3	1	-	-	-	3	3
IEG 506-1	1	1	2	-	-	-	-	2	2
IEG 506-2	1	3	2	-	-	-	-	2	2
IEG 506-3	-	3	3	1	-	-	-	2	2
IEG 506-4	1	2	3	1	-	-	-	3	3
IEG 506-5	1	2	-	-	-	-	-	3	3
IEG 506-6									

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.

CONTENT:

J) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 out of 15 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	To introduce different types of robotics and identify different parts and components.	Learn & understand the concept of	IEG506-1
2	To prepare a report on following points using searching of information through internet: 1. Manipulator 2. End effectors	Learn & understand the concept of robotics and prepare report.	IEG506-1

	3.Link 4. Joint 5. Robot Motion 6. Robot Applications.		
3	To study of Robot Motion Vertical transverse, Radial transverse.	Understanding the concept of Vertical transverse, Radial transverse.	IEG506-2
4	To study of Rotational transverse , 2,3 and 4 Degree of freedom, Speed of Motion	Understanding the concept of, Rotational transverse , 2,3 and 4 Degree of freedom, Speed of Motion	IEG506-2
5	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	IEG506-2
6	To prepare a report on comparison and application of the various type of grippers mentioned in the syllabus with reference to following points: Types gripper mechanism, Applications and Effect of loading (load carrying capacity)	Learn & understand the concept	IEG506-3
7	To study of Hydraulic Drives, Electric Drive, Pneumatic Drive	Learn & understand the concept of Hydraulic Drives.	IEG506-3
8	To study of Electric Drive and Pneumatic Drive	Learn & understand the concept of Electric Drive, Pneumatic Drive	IEG506-3
9	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	IEG506-4
10	To determine various factors affecting on proximity using proximity switch.	Learn & understand the concept	IEG506-4
11	Study the machine vision technique used for robot	Learn & understand the concept	IEG506-4
12	Study the use of robot in spray coating application.	Learn & understand the concept	IEG506-5
13	Search the information from the internet about any one application of robot and make	Learn & understand the concept	IEG506-5
14	To prepare chart of different parameters of robot maintenance	Learn & understand the concept	IEG506-6
15	Study different types of robots by arranging industrial visits.	Understand the application of Robots in various Industries	IEG506-6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably

individually undertaken. Each microproject should encompass two or more COs. Each student has to maintain dated work diary consisting of individual contribution in the microproject work. Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- i. Prepare a chart for classification of robots based on applications.
- ii. Design a line follower robot
- iii.

K) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>IEG506-1 Identify the different robot components, specifications and its constructional details.</i>			
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
<i>IEG506-2 Understand the robot classification, anatomy, motion and its drive system.</i>			
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
<i>IEG506-3 Understand the gripper mechanism and robot end effectors.</i>			
3	Robot End effectors 3.1 Gripper Mechanisms CAM actuated gripper, Screw type gripper, 3.2 Vacuum cubs, Magnetic grippers, Adhesive	06	12

	grippers, Hooks & other misc. devices 3.3 END effector interface: Physical Support, Power & signal transmission, Various consideration in gripper selection		
	Sub-total	24	40

Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEG506-4 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
IEG506-5 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
IEG506-6 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
	Sub total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Robots Parameters	06	06	02	IEG506-1	14
2	Robot motion	06	06	02	IEG506-2	14
3	Robot End effectors	04	04	04	IEG506-3	12
4	Sensors in Robots	04	06	04	IEG506-4	14
5	Applications of Robotics	04	06	02	IEG506-5	12
6	Maintenance & Safety	06	04	04	IEG506-6	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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

u) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma X.*

v) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board
2. Video clips
3. PPTs
4. Question Bank
5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS 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

- i. www.adept.com
- ii. www.robots.epson.com
- iii. www.tpctraining.com
- iv. www.kawasakirobotics.com
- v. www.fanuc.com
- vi. www.panasonic.com
- vii. www.motoman.com
- viii. www.festo.com

* * *

LEVEL - V

MANAGEMENT AND DIVERSIFIED COURSES

COURSE ID :

Course Name : Entrepreneurship Development
Course Code : CCG501
Course Abbreviation : GESU

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	Term Work	Practical Examination (Internal)	
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii. One PST of 25 marks	--	--	*As per Proforma-III	
Marks	--	--	--	--	50E	50

* Assessment as per pro-forma-III

E– External Examination

RATIONALE:

Globalization, liberalization and Privatization along with revolution in information technology have opened up new opportunities transforming lives of masses. In this context, there is an immense opportunity of establishing manufacturing, service, trading, marketing and consultancy enterprises by diploma engineer, Our fast growing economy provides ample scope for diploma engineers to succeed as an entrepreneur. Entrepreneurship requires distinct skill sets which are attempted to be developed through this course. To begin with, this course aims to develop the competency and the related outcomes in order to start small enterprises.

COMPETENCY :

The aim of this course is help the students to attain the following industry identified competency through various teaching & learning experiences:

Cognitive : i) Understanding and applying principles and labor laws ii) Observing iii) Classifying iv) Interpreting

Psychomotor: Man power handling.

Affective: i) Follow the safe practices, ii) Practice good housekeeping iii) Maintain tool and equipment

COURSE OUTCOMES:

CCG501-1: Identify your entrepreneurial attributes

CCG501-2: Identify the business opportunities that suits you

CCG501-3: Use the support systems to zero down to your business idea.

CCG501-4: Develop comprehensive business plans.

CCG501-5: Prepare plans to manage the enterprise effectively.

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 and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solution	PO 4 Engineering Tools, Experimentation and Testing	PO 5 The engineering Practices for society, Sustainability and environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1	PSO2
Competency: The aim of this course is help the students to attain the following industry identified competency	--	2	3	2	3	3	2	3	3
CCG501-1.	--	2	--	--	2	--	1 --	--	--
CCG501-2	--	2	--	--	2	--	1	--	2-
CCG501-3	--	2	2	1	--	2	2	--	3
CCG501-4.	--	--	3	2	3	--	2	2	3
CCG501-5.	--	--	3	--	2	3	--	2	3

CONTENT :

i. PRACTICLAS / EXERCISES:

The practical's in this sections are the sub components of the COs to be developed and assessed in the students for the attainment of the competency.

Sr. No.	Practical Outcomes (PrOs)	Unit Nos.	Approx Hrs. Required
1	Submit a profile summary (about 500 words) of a successful entrepreneur indicating milestone achievement.	I	02*
2	Undertaking SWOC analysis to arrive at your business idea of a product / service.	I	02
3	General business ideas (product / service) for intrapreneurial and entrepreneurial opportunities through brainstorming.	II	02
4	Undertake self-assessment test to discover your entrepreneurial opportunities.	II	02*
5	Identify business opportunities/self-employments areassuitable for you.	II	02
6	Survey industries of your stream; grade them according to the level of scale of production, investment, turnover, pollution to prepare a report on it.	II	02
7	Visit a bank/Financial institution to enquire about various funding schemes for small scale enterprise.	III	02*
8	Collect loan application forms of national banks/other financial institutions.	III	02*
9	Compile the information from financial agencies that will help you set up your business enterprise.	III	02*
10	Compile the information from government agencies that will help you set up your business enterprise.	III	02*
11	Prepare Technological feasibility report of a chosen product/service.	III	02*
12	Prepare a set of short term, medium and long term goals for starting a chosen small scale enterprise.	III	02*
13	Prepare marketing strategy for your chosen product/service.	IV	02*
14	Compile the information about insurance schemes covering different risk factors.	IV	02
15	Find the breakeven point for the business idea chosen by you.	V	02
16	Prepare a business plan for your chosen small scale enterprise.	V	02*
17.	Organize funfair for your class and write report of profit/loss.	V	02
18.	Visit report of any industry: Brief history, types and details of services/support assistance being given, any other information which is useful to self-employer/entrepreneur.	V	02

Note: A judicial mix of minimum 12 or more practical need to be performed, out of which, the

Practical's marked as '*' are compulsory, so that the student reaches the 'Precision Level of

Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry.
 The above practical Outcomes also comprise the following social skills/attitudes which are Affective Domain Outcomes that are best developed through the laboratory/field based experiences:

- a. Follow safe practices
- b. Good housekeeping practices
- c. Practice energy conservation
- d. Demonstrate working as a leader/a team member
- e. Maintain tools and equipments
- f. Follow ethical practices

The Affective Domain Outcomes are not specific to any one Practical Outcomes, but are embedded in many Practical Outcomes. Hence, the acquisition of the Affective Domain Outcomes takes place gradually in the students when he/she undertake a series of practical experiences over a period of time.

ii) THEORY:

Sr. No.	Topics / Sub-topics	Lectures (Hours)
1	Entrepreneurship Development- Concept and Scope 1.1 Concepts and Overview of Entrepreneurship.Evolution and Growth of Entrepreneurship in India. Role of Entrepreneurship in Economic Development. Entrepreneurship as a career. 1.2 Traits of successful intrapreneur / entrepreneur: Consistency, creativity, initiative, independent decision making, assertiveness, persuasion, persistence, information seeking, 1.3 Entrepreneurship: Scope in local and global market. 1.4 Intrapreneur and entrepreneur. 1.5 Types of enterprises and their features: Manufacturing, Service and trading. 1.6 Steps in Setting up of a business	06
2	Entrepreneurial Opportunities and Selection Process: 2.1Product / Service selection: Process, core competence, product / service life cycle, new product / service development process, mortality curve, Creativity and innovation in product / Service modification / development. 2.2 Process selection: Technology life cycle, forms and cost of transformation, Factors affecting process selection, Location for an industry, Material handling. 2.3 Market study procedures: Questionnaire design, sampling, Market survey, Data analysis 2.4 Getting information from concerned stake holders such as Maharashtra Centre for Entrepreneurship Development (MCED), National Institute for Micro, Small and Medium Enterprises (NI-MSME, Prime Minister Employment Generation Program (PMEGP), Directorate of Industries (DI), Khadi Village Industries Commission (KVIC).	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)
3	Support Systems: 3.1 Categorization of MSME, Ancillary Industries. . 3.2 Support system-Government Agencies: MCED, NI- MSME, PMEGP, DI, KVIC. 3.3 Support agencies for entrepreneurship guidance, training, registration, technical consulation, technology transfer and quality control, marketing and finance 3.4 Breakeven point, return of investment and return on sales.	06
4	BUSINESS PLAN PREPARATION: 4.1 Sources of Product for Business: Feasibility study. 4.2 Ownership, Capital, Budgeting, Matching Entrepreneur with the project, Feasibility report preparation and evaluation criteria. 4.3 Business plan preparation.	06
5	Managing Enterprise: 5.1 Unique Selling proposition (U.S.P.): Identification, Developing a marketing plan. 5.2 Preparing Strategies of handling Business: Policy making, negotiation and bargaining techniques. 5.3 Risk management: [planning for calculated risk taking, initiation with low cost projects, integrated futuristic planning, angel investors, venture capitalist. 5.4Incubation centers: Role and procedure.	06

Performance Indicator: -

Sr. No.	Performance Indicators	Weightage in %
1	Leadership Skills	20
2	Team Work	20
3	Lateral / Creative Thinking	10
4	Observation and Recording	10
5	Self-learning	20
6	Answer the simple questions	10
7	Submission of report on time	10
Total		100

MAJOR EQUIPMENTS/INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will user in uniformity in conduct of experiments, as well as aid to procedure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	Seminar Hall equipped with conference table, chairs and multimedia facilities.	All
2	Modern Desktop Computer with internet connection.	All

SUGGESTED STUDENT ACTIVITY –Under Micro-Project

Other than the classroom and laboratory learning, following are the suggested student related Co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare report of about 5 pages for each activity, also collect/record physical evident for their (student's) portfolio which will be useful for their placement interviews:

- a. Download product development and innovative films from internet.
- b. Prepare collage for "Traits of Successful entrepreneurs"
- c. Identify your hobbies and interests and convert them into business idea.
- d. Convert your project work into business.
- e. Decide any product and analyze its good and bad features.
- f. Choose any product and study its supply chain.
- g. Visit industry exhibitions, trade fairs and observe nitty-gritty of business.
- h. Perform a survey and identify local resources available for setting up of an enterprise.
- i. Conduct a market survey for a project. Collect data on machinery specifications, price, output/hr, power consumption, manpower requirement, wages, raw material requirement, specification, competitor's product price, features, dealer commissions, and marketing mix.
- j. Prepare a business plan and organize a business plan competition.

SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Books	Author	Publication
1	The entrepreneurial Instinct: How Everyone Has the Innate Ability to Start a Successful Small Business.	Mehta, Monica	McGraw-Hill Education, New Delhi, 2012, ISBN 978-0-07-179742-9
2	Entrepreneurship	Hisrich R. D.	McGraw-Hill Education, New Delhi, 2013, ISBN-13: 978-1259001635
3	Part I Readings in Entrepreneurship Education	Sareen S.B.	Entrepreneurship Development Institute of India (EDI), GOI, Ahmedabad, 2016; ISBN: 978-0078029169
4	Reading Materials of Entrepreneurship Awareness Camp	Gujral, Raman	Entrepreneurship Development Institute of India (EDI), GOI, Ahmedabad
5	Product Design and manufacturing	Chitale A.K.	PHI Learning, New Delhi, 2014; ISBN: 9788120348738
6	Entrepreneurship Development Small Business Entrepreneurship	Charantimath, Poornima	Pearson Education India, New Delhi; ISBN: 9788131762264
7	Entrepreneurship Development: Special Edition for MSBTE	CPSC, Manila	Tata McGraw Hill, New Delhi
8	Entrepreneurship Development Small Business Management	Khanka S. S.	S. Chand and sons, New Delhi, ISBN: 978-93-5161-094-6
9	Entrepreneurship Development	S. Anil Kumar	New Age International, New Delhi, ISBN:

SUGESTED SOFTWARE/LEARNING RESOURCES

Sr. No	SOFTWARE/LEARNING RESOURCES	LINKS
1	MCED Book Links	http://www.mced.nic.in/UdyojakSpecial.aspx?linktype=Udyojak
2	MCED Product and Plan Details	http://www.mced.nic.in/allproduct.aspx
3	The national Institute for Entrepreneurship and Small Business Development Publications	http://www.mced.nic.in/Publications.html
4	Courses: The National Institute of Small Business Development Publication	http://niesbud.nic.in/docs/1standardized.pdf
5	Entrepreneur.com	http://www.entrepreneur.com/lists
6	GOVERNMENT SPONSORED SCHEMES	http://www.nabard.org/content1.aspx?id=23andcatid=23andmid=530
7	NABARD- Information Centre	http://www.nabard.org/Tenders.aspx?cid=501andid=24
8	NABARD – What we do	http://www.nabard.org/content1.aspx?id=8andcatid=8andmid=488
9	Market Review	http://www.businesstoday.in/markets
10	Start Up India	http://www.startupindia.gov.in/pdf/file.php?title=Sartup%20India%20Action%20Planandtype=Actionandq=Action%20Plan.pdfandcontent_type=Actionandsubmenupoint=action
11	About – Entrepreneurship Development Institute of India (EDII)	http://www.ediindia.org/institute.html
12	EDII –Centres	http://www.ediindia.org/centres.html
13	EDII – Publications	http://www.ediindia.org/publication.html
14	Business Plan: A Step-By-Step Guide	http://www.entrepreneur.com/article/247574
15	The National Science and Technology Entrepreneurship Development Board (NSTEDB)	http://www.nstedb.com/index.html
16	NSTEDB – Training	http://www.nstedb.com/training/training.html
17	Tata Exposures	http://www.tatasocial-in.com/project-exposure
18	Ministry of Micro, Small and Medium Enterprises	http://www.dcmsme.gov.in/schemes/TEQUPDetail.html
19	List of Business Ideas for Small Scale Industry	http://small.sidbi.in%20/thinking-starting-business/big-list-business-ideas-small-business
20	Thinking of Entrepreneurship	http://smallb.sidbi.in/entrepreneurship-stage/thinking-entrepreneurship
21	List of Service for Small Scale Industry	http://www.archive.india.gov.in/business/Industry_services/illustrative.php
22	NSIC Schemes and Services	http://www.nsic.co.in/SCHSERV.ASP

COURSE ID :

Course Name : Internship-I (4 weeks)

Course Code : CCG502

Course Abbreviation : GINO

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	--	03
Practical	--	

Evaluation Scheme :

Component	Progressive Assessment		Semester end		Total
	Theory	Practical	Theory	Practical*	
Duration	Average of two tests of 20 marks each	One Skill Test (2 hours) *	One paper (3 hours)	One practical (2 hours)	
Marks	---	--	---	50 E	50

* Assessment as per scheme given in Table-3 and Table -4 and convert these marks as per Proforma-I ,E– External Examination

RATIONALE

This Industrial training (internship) is compulsorily introduced for all the diploma programmes to expose the students for a longer period to the industrial environment and develop the relevant good habits of industry culture among the students before they enter the industry. By exposing and interacting with the real life industrial setting, the students will appreciate and get accustomed to the actual working of an industry along with the best practices adopted by them. The industrial culture skills fall under soft skills, life skills and hands-on which will be inculcated among the students. Such a short exposure will be an effective association with the industry, for the students and will be instrumental in orienting them to be industry ready, to a much greater extent than the present ones, after completion of the respective diploma programme.

COMPETENCY

The course is intended to develop the following competencies:

- **Soft Skills such as: Communication, Presentation etc.**

- **Life skills such as: Time management, Safety, Innovation, Entrepreneurship, Team building etc.**
- **Hands-on skills such as: Design, Implementation, Different operations, Quality Assurance etc.**

COURSE OUTCOMES

The industrial training (internship) related competencies as mentioned above to supplement those attained through several courses up to fourth semester of the relevant programme can be achieved by the following course outcomes:

CCG502-1: Communicate effectively (verbal and equally written) the works carried out.

CCG502-2: Prepare and present the report of the works carried out.

CCG502-3: Exercise time management and safety in the work environment.

CCG502-4: Work effectively as a team member.

CCG502-5: Demonstrate various quality assurance skills.

Note: Both ESE and PA part of assessment will be carried out by institute faculty and industry training supervisor as explained in the relevant proforma of assessment.

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 and Discipline Specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solution	PO 4 Engineering Tools, Experimentation and Testing	PO 5 The engineering Practices for society, Sustainability and environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Soft Skills Life skills. Hands-on skills	2	2	3	2	2	2	3	3	3
CCG502-1:	2	-	-	-	-	-	2	-	-
CCG502-2:	-	1	3	2	-	-	2	-	-
CCG502-3:	-	-	2	-	-	-	2	3	3
CCG502-4:	-	-	-	-	-	2	2	3	3
CCG502-5:	-	-	3	-	-	-	2	-	-

1. GENERAL GUIDELINES FOR INDUSTRIAL TRAINING

- a) **Training during the programme:** Between 4th and 5th semester (During Summer Vacation).
- b) **Duration of the training:** four/three weeks
- c) **Training Area:** Students should be trained in large and medium scale Industry / Organization. However, despite the best efforts by the institute, if large and medium scale Industry / Organization are not available to all students then, students can also be placed in small scale Industry / Organization.
- d) These Industries / Organizations can be Government /Public limited/ or Private family enterprises.

For **Civil engineering** it can be public works department, irrigation department, public health engineering, municipal corporations, town and country planning, highway and roads authorities, railways, large and medium scale civil contractors, rural engineering departments, environment corporations, large and medium scale private construction companies, mining companies etc.

For **Mechanical Engineering** it can be manufacturing, fabrication, foundry or processing industry which may include compressors, boilers, engines, heat exchangers, air conditioning and refrigeration plants, conveyors etc are either manufactured or used. Power plants, Railways, process plants, ordinance factories, textile factories, automobile manufacturers or major automobile workshops.

For **Electrical engineering** it can be electricity transmission and distribution companies, power generating stations, sub stations, railways, industries manufacturing electrical products which may include industry where large motors/transformers etc. are used, process plants, electrical contractors.

For **Electronic and Industrial Electronics engineering** it can be telecommunication companies, post and telegraph department, manufacturer of telecommunication product, manufacturers of control equipments, manufacturer of CNC machines, any manufacturing industry where electronic controls are used either in production process or in its products, computer hardware manufacturers, signal divisions of railways, etc.

For **IT** industries it can be any software developers, cyber security companies, web page developers, networking companies, data base management companies, telecommunication companies or IT division of any other industries/finance/retail companies or organizations where software are used and maintained for various applications.

For **Metallurgical Engineering** it may include documenting the work, operating the lab mixtures, preparation of specimens, Metallographic testing of specimens, assisting the senior engineers etc.

2. ROLE OF PARENT DEPARTMENT OF THE INSTITUTES

Sr. No	Activity	Schedule
1	Collecting information about Industry /	Before completion of 3 rd semester

	Organization available for training along with capacity (Format - 1)	
2	Student and mentor allocation as per the slots available for in-plant training (Desirable mentor-student ratio is 1:15)	Before commencement of 4 th semester
3	Communication with Industry / Organization available for training along with capacity and its confirmation	Before first Unit Test of the 4 th semester
4	Obtaining consent letter from parents / guardian (Format - 2)	Before second Unit Test of the 4 th semester
5	Student enrollment for In-plant training (Format-3)	Before commencement of 4 th semester examination
6	Issue letter to the Industry / Organization for the training along with details of students and mentors. (Format - 4)	During 4 th semester examination
7	Mentors to carry out progressive assessment of the students during the in-plant training (Format -5)	Each week of training
8	End of training assessment by mentor along with Industry / Organization expert as external examiner (Format - 6)	Before 5 th semester ESE

Suggestions:

- Departments can take help of alumni or present students (if they or their parents or relatives have some contact in different industries) for securing placement.
- The students would normally be placed as per their choices, in case of more demand for a particular Industry / Organization students would be allocated place based on their relative merit. However, if some students have arranged training placement in some companies with the help of their parents/relatives etc. then they will be given preference for placement in those companies.
- Principal/HOD/Faculty should address students about industrial safety norms, rules and discipline to be maintained in the Industry / Organization during the training before relieving students for training.
- The faculty member during the visit to Industry / Organization will check the progress of the student in the training, his/ her attendance, discipline and project report preparation.

3. EXPECTATIONS FROM INDUSTRY

Helping the institute in developing the following competencies among students

- **Soft Skills such as: Communication, Presentation etc.**
- **Life skills such as: Time management, Safety, Innovation, Entrepreneurship, Team building etc.**
- **Hands-on skills such as: Design, Implementation, Different operations, Quality Assurance etc.**

4. ROLES AND RESPONSIBILITIES OF THE STUDENTS

Following should be informed to students in the letter deputing them for the training, an undertaking for this should also be taken from them

- a) Students would interact with the mentor to suggest choices for suitable Industry / Organization. If students have any contact in Industry / Organization (through their parents, relatives or friends) then same may be utilized for securing placement for themselves and their peers.
- b) Students have to fill the forms duly signed by authorities along with training letter and submit it to training officer in the industry on the first day of training. Student should also carry with him/her the Identity card issued by institute during training period.
- c) He/she will have to get all the necessary information from the training officer regarding schedule of the training, rules and regulations of the Industry / Organization and safety procedures to be followed. Student is expected to observe these rules, regulations, procedures.
- d) Students should know that if they break any rule of industry or do not follow the discipline then industry can terminate the training and sent back the students.
- e) It is the responsibility of the student to collect information from Industry / Organization about manufacturing processes / testing and quality assurance methods/specifications of machines and raw materials/maintenance procedures/ production planning/organizational structure etc.
- f) During the training period students have to keep record of all the useful information in Log book and maintain the weekly diary as provided and get it signed from mentor as well as Industry / Organization training in-charge.
- g) In case they face any major problem in industry such as an accident or any disciplinary issue then they should immediately report the same to the institute.
- h) Prepare final report about the training for submitting to the department at the time of presentation and viva-voce and get it signed from mentor as well as Industry / Organization training in-charge.

5. FORMAT FOR TRAINING REPORT

Following is the suggestive format for the training report, actual format may differ slightly depending upon the nature of Industry / Organization. The training report may contain the following

- Title page
- Certificate
- Abstract
- Acknowledgement
- Content Page

Chapter 1. Organizational structure of Industry / Organization and General Lay Out

Chapter 2. Introduction of Industry / Organization (Type of products and services, history, turn over and number of employees etc.)

Chapter 3. Types of major equipment/instruments/ machines used in industry with their specification, approximate cost and specific use and their routine maintenance.

Chapter 4. Manufacturing Processes along with production planning and control methods.

Chapter 5. Testing of raw materials, components and finished products along with quality assurance procedures.

Chapter 6. Major material handling product (lifts, cranes, slings, pulleys, jacks, conveyor belts etc.) and material handling procedures.

- Chapter 7. Safety procedures followed and safety gear used (includes Preventive maintenance schedule and breakdown maintenance procedures).
- Chapter 8. Particulars of Practical Experiences in Industry / Organization if any in Production/ Assembly/ Testing/Maintenance.
- Chapter 9. Short report/description of the project (if any done during the training)
- Chapter 10. Special/challenging experiences encountered during training if any (may include students liking & disliking of work places)

References /Bibliography

6. SUGGESTED LEARNING STRATEGIES

Students should visit the website of the industry where they are undergoing training to collect information about products, processes, capacity, number of employees, turnover etc. They should also refer the handbooks of the major machines and operation, testing, quality control and testing manuals used in the industry. Students may also visit websites related to other industries wherein similar products are being manufactured as their learning resource.

7. TENTATIVE WEEK-WISE SCHEDULE OF INDUSTRIAL TRAINING

The industrial training is a common course to all programmes; therefore the industry / Organization selection will depend upon the nature of programme and its related industry. The training activity may vary according to nature and size of Industry / Organization. The following table details suggestive schedule for industrial training for all programmes.

Table - 2 Detail week schedule and Marks distribution

S. No.	Week No.	Details of activities to be completed during Industrial training	Marks distribution/ week for PA
1	Week No. 1	Induction to industry and its departments	05
		Study of layout and specifications of major machines, equipment and raw materials / components / software used.	05
2	Week No. 2	Study of setup ,processes/ milestone project.	05
		Study of QA/QC procedures.	10
		Study safety and maintenance procedure in an industry/organization	
3	Week No. 3	Build a project as per requirements from Industry	10
4	Week No. 4	Report Submission and Completion certificate	05
PA marks to be given by industry supervisor			25
PA marks to be given by polytechnic faculty based on performance			10
Total PA marks for training			75

Table - 3 ASSESSMENT SCHEME FOR INDUSTRIAL TRAINING

Trainin g duratio n	PROGRESSIVE ASSESSMENT (Weekly report of all 4week and attendance)		END SEMESTER ASSESSMENT (Seminar and Oral)		Total marks	
	Max. marks	Min. marks	Max. marks	Min. marks	Max. marks	Min. marks
	#75	-----	75**	30	150	60

**assessed by external examiner based on report (25 Marks), presentation (25 Marks) and Viva-Voce (25 Marks)

Table - 4 Distribution of End-Semester-Examination (ESE) marks of Industrial Training for Internal and External Examiners

Marks for Industrial Training Report	Marks for Seminar/ Presentation	Marks for Oral/Viva-voce	Total ESE marks
25	25	25	75

Format-1 : Information about Industry/Organisation for training

- 1) Name of the industry/organisation:
- 2) Address/communication details(incl email):
- 3) Contact person details:
 - a) Name:
 - b) Designation:
 - c) Email
 - d) Contact number/s:
- 4) Type:
Govt / PSU / Pvt /
Large scale / Medium scale / Small scale
- 5) Products/services offered by industry:
- 6) a) Whether willing to offer Industrial training facility during May/ June for Diploma in Engineering students: Yes / No.
b) If yes, whether you offer 6 weeks training : YES/NO
c) Internship capacity possible:

Programme	Civil Engg	Mechanical Engg	Electrical Engg	Total
Male					
Female					
Total					

- 7) Whether accommodation available for interns Yes / No.
If yes capacity: _____
- 8) Whether internship is charged or free:
If charged please specify amount per candidate: _____

Signature of responsible person:

Format-2 : Obtaining Consent Letter from parents/guardians
(Undertaking from Parents)

To,
The Principal,

_____ ,

Subject: Consent for Industrial Training.

Sir/Madam,

I am fully aware that -

- i) My ward studying in _____ semester at your _____ institute has to undergo six weeks of Industrial training for partial fulfillment towards completion of Diploma in _____ Engineering.
- ii) For this fulfillment he/she has been deputed at _____ industry, located at _____ for internship of _____ weeks for the period from _____ to _____ .

With respect to above I give my full consent for my ward to travel to and from the mentioned industry. Further I undertake that –

- a) My ward will undergo the training at his/her own cost and risk during training and/or stay.**
- b) My ward will be entirely under the discipline of the organization where he/she will be placed and will abide by the rules and regulations in face of the said organization.**
- c) My ward is NOT entitled to any leave during training period.**
- d) My ward will submit regularly a prescribed weekly diary ,duly filled and countersigned by the training supervisor of the organization to the mentor faculty of the polytechnic.**

I have explained the contents of the letter to my ward who has also promised to adhere strictly to the requirements. I assure that my ward will be properly instructed to take his own care to avoid any accidents/injuries in the industry. In case of any accident neither industry nor the institute will be held responsible.

Signature :

Name : _____

Address : _____

Phone Number: _____

Format-3 : Student enrollment for In-plant training (To be design by programme department)

Sr. no.	Enrolment no.	Name,email id,Contact no.	Mentor, email id,Contact no.	Name of Industry,Adress, email id,Contact no.

Format-4: Issue Letter to the Industry/Organisation for the training alongwith details of students and mentors

To,
The HR Manager,

Subject: Placement for Industrial training of ____ weeks in your organization....

Reference: Your consent letter no:

Sir,
With reference to the above we are honored to place the following students from this institute for Industrial training in your esteemed organization as per the arrangement arrived at.

Diploma programme in _____ Engg.

Sr. no.	Enrolment no.	Name:	Mentor

Kindly do the needful and oblige.
Thanking you in anticipation

Yours sincerely,

(Principal)
Name of the Institute:
with Seal

FORMAT-5
PA of Internship-I

Academic year : 20 -20

Name of the industry:

Sr. No .	Enrolmen t Number	Na me of stud ent	Marks					PA Marks by Industry Supervis or	PA based on Repo rt by ment or facult y	Total
			Wee k 1(O ut of 10)	Wee k 2(O ut of 15)	Wee k 3(ou t of 10)	Wee k 4(O ut of 5)	Total (A)(o ut of 40)	Out of 25 (B)	Out of 10 (C)	Out of 75 (A)+(B)+(C)

Marks for PA are to be awarded for each week considering the level of completeness of activity observed, from the daily diary maintained and feedback from industry supervisor.

:
Name & Signature of mentor

Format-6: End of training assessment by mentor along with Industry/Organization expert as external examiner

Marks for Industrial Training Report	Marks for Seminar/Presentation	Marks for Oral/Viva-voce	Total ESE marks
25	25	25	75

COURSE ID :

Course Name : Internship-II (3 weeks)

Course Code : CCG503

Course Abbreviation : GINT

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

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

Evaluation Scheme :

Component	Progressive Assessment		Semester end		Total
	Theory	Practical	Theory	Practical*	
Duration	Average of two tests of 20 marks each	One Skill Test (2 hours) *	One paper (3 hours)	One practical (2 hours)	
Marks	---	--	---	50 E	50

* Assessment as per scheme given in Table-3 and Table -4 and convert these marks as per Proforma-I ,E– External Examination

RATIONALE

This Industrial training (internship) is compulsorily introduced for all the diploma programme to expose the students for a longer period to the industrial environment and develop the relevant good habits of industry culture among the students before they enter the industry. By exposing and interacting with the real life industrial setting, the students will appreciate and get accustomed to the actual working of an industry along with the best practices adopted by them. The industrial culture skills fall under soft skills, life skills and hands-on which will be inculcated among the students. Such a short exposure will be an effective association with the industry, for the students and will be instrumental in orienting them to be industry ready, to a much greater extent than the present ones, after completion of the respective diploma programme.

COMPETENCY

The course is intended to develop the following competencies:

- **Soft Skills such as: Communication, Presentation etc.**

- **Life skills such as: Time management, Safety, Innovation, Entrepreneurship, Team building etc.**
- **Hands-on skills such as: Design, Implementation, Different operations, Quality Assurance etc.**

COURSE OUTCOMES

The industrial training (internship) related competencies as mentioned above to supplement those attained through several courses up to fourth semester of the relevant programme can be achieved by the following course outcomes:

CCG503-1: Communicate effectively (verbal and equally written) the works carried out.

CCG503-2: Prepare and present the report of the works carried out.

CCG503-3: Exercise time management and safety in the work environment.

CCG503-4: Work effectively as a team member.

CCG503-5: Demonstrate various quality assurance skills.

Note: Both ESE and PA part of assessment will be carried out by institute faculty and industry training supervisor as explained in the relevant proforma of assessment.

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic and Discipline Specific knowledge	PO 2 Problem Analyses	PO 3 Design / Development of solution	PO 4 Engineering Tools, Experimentation and Testing	PO 5 The engineering Practices for society, Sustainability and environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
<ul style="list-style-type: none"> • Competency: Soft Skills • Life skills. • Hands-on skills 	2	2	3	2	2	2	3	3	3
CCG502-1	2	-	-	-	-	-	2	-	-
CCG502-2:.	-	1	3	2	-	-	2	-	-
CCG502-3.	-	-	2	-	-	-	2	3	3
CCG502-4:.	-	-	-	-	-	2	2	3	3
CCG502-5:	-	-	3	-	-	-	2	-	-

GENERAL GUIDELINES FOR INDUSTRIAL TRAINING

- a) **Training during the programme:** After 5th semester (During Winter Vacation).
- b) **Duration of the training:** Three weeks
- c) **Training Area:** Students should be trained in large and medium scale Industry / Organization. However, despite the best efforts by the institute, if large and medium scale Industry / Organization are not available to all students then, students can also be placed in small scale Industry / Organization.
- d) These Industries / Organizations can be Government /Public limited/ or Private family enterprises.

For **Civil engineering** it can be public works department, irrigation department, public health engineering, municipal corporations, town and country planning, highway and roads authorities, railways, large and medium scale civil contractors, rural engineering departments, environment corporations, large and medium scale private construction companies, mining companies etc.

For **Mechanical Engineering** it can be manufacturing, fabrication, foundry or processing industry which may include compressors, boilers, engines, heat exchangers, air conditioning and refrigeration plants, conveyors etc are either manufactured or used. Power plants, Railways, process plants, ordinance factories, textile factories, automobile manufacturers or major automobile workshops.

For **Electrical engineering** it can be electricity transmission and distribution companies, power generating stations, sub stations, railways, industries manufacturing electrical products which may include industry where large motors/transformers etc. are used, process plants, electrical contractors.

For **Electronic and Industrial Electronics engineering** it can be telecommunication companies, post and telegraph department, manufacturer of telecommunication product, manufacturers of control equipments, manufacturer of CNC machines, any manufacturing industry where electronic controls are used either in production process or in its products, computer hardware manufacturers, signal divisions of railways, etc.

For **IT** industries it can be any software developers, cyber security companies, web page developers, networking companies, data base management companies, telecommunication companies or IT division of any other industries/finance/retail companies or organizations where software are used and maintained for various applications.

For **Metallurgical Engineering** it may include documenting the work, operating the lab mixtures, preparation of specimens, Metallographic testing of specimens, assisting the senior engineers etc.

ROLE OF PARENT DEPARTMENT OF THE INSTITUTES

Sr. No	Activity	Schedule
1	Collecting information about Industry / Organization available for training along with capacity (Format - 1)	Before completion of 4 th semester
2	Student and mentor allocation as per the slots available for in-plant training (Desirable mentor-student ratio is 1:15)	Before commencement of 5 th semester
3	Communication with Industry / Organization available for training along with capacity and its confirmation	Before first Unit Test of the 5 th semester
4	Obtaining consent letter from parents / guardian (Format - 2)	Before second Unit Test of the 5 th semester
5	Student enrollment for In-plant training (Format- 3)	Before commencement of 5 th semester examination
6	Issue letter to the Industry / Organization for the training along with details of students and mentors. (Format - 4)	During 5 th semester examination
7	Mentors to carry out progressive assessment of the students during the in-plant training (Format - 5)	Each week of training
8	End of training assessment by mentor along with Industry / Organization expert as external examiner (Format - 6)	After 5 th semester ESE

Suggestions:

- Departments can take help of alumni or present students (if they or their parents or relatives have some contact in different industries) for securing placement.
- The students would normally be placed as per their choices, in case of more demand for a particular Industry / Organization students would be allocated place based on their relative merit. However, if some students have arranged training placement in some companies with the help of their parents/relatives etc. then they will be given preference for placement in those companies.
- Principal/HOD/Faculty should address students about industrial safety norms, rules and discipline to be maintained in the Industry / Organization during the training before relieving students for training.
- The faculty member during the visit to Industry / Organization will check the progress of the student in the training, his/ her attendance, discipline and project report preparation.

EXPECTATIONS FROM INDUSTRY

Helping the institute in developing the following competencies among students

- **Soft Skills such as: Communication, Presentation etc.**
- **Life skills such as: Time management, Safety, Innovation, Entrepreneurship, Team building etc.**
- **Hands-on skills such as: Design, Implementation, Different operations, Quality Assurance etc.**

ROLES AND RESPONSIBILITIES OF THE STUDENTS

Following should be informed to students in the letter deputing them for the training, an undertaking for this should also be taken from them

- a) Students would interact with the mentor to suggest choices for suitable Industry / Organization. If students have any contact in Industry / Organization (through their parents, relatives or friends) then same may be utilized for securing placement for themselves and their peers.
- b) Students have to fill the forms duly signed by authorities along with training letter and submit it to training officer in the industry on the first day of training. Student should also carry with him/her the Identity card issued by institute during training period.
- c) He/she will have to get all the necessary information from the training officer regarding schedule of the training, rules and regulations of the Industry / Organization and safety procedures to be followed. Student is expected to observe these rules, regulations, procedures.
- d) Students should know that if they break any rule of industry or do not follow the discipline then industry can terminate the training and sent back the students.
- e) It is the responsibility of the student to collect information from Industry / Organization about manufacturing processes / testing and quality assurance methods/specifications of machines and raw materials/maintenance procedures/ production planning/organizational structure etc.
- f) During the training period students have to keep record of all the useful information in Log book and maintain the weekly diary as provided and get it signed from mentor as well as Industry / Organization training in-charge.
- g) In case they face any major problem in industry such as an accident or any disciplinary issue then they should immediately report the same to the institute.
- h) Prepare final report about the training for submitting to the department at the time of presentation and viva-voce and get it signed from mentor as well as Industry / Organization training in-charge.

FORMAT FOR TRAINING REPORT

Following is the suggestive format for the training report, actual format may differ slightly depending upon the nature of Industry / Organization. The training report may contain the following

- Title page
- Certificate
- Abstract
- Acknowledgement
- Content Page

Chapter 11. Organizational structure of Industry / Organization and General Lay Out

Chapter 12. Introduction of Industry / Organization (Type of products and services, history, turn over and number of employees etc.)

Chapter 13. Types of major equipment/instruments/ machines used in industry with their specification, approximate cost and specific use and their routine maintenance.

Chapter 14. Manufacturing Processes along with production planning and control methods.

Chapter 15. Testing of raw materials, components and finished products along with quality assurance procedures.

Chapter 16. Major material handling product (lifts, cranes, slings, pulleys, jacks, conveyor belts etc.) and material handling procedures.

Chapter 17. Safety procedures followed and safety gear used (includes Preventive maintenance schedule and breakdown maintenance procedures).

Chapter 18. Particulars of Practical Experiences in Industry / Organization if any in Production/ Assembly/ Testing/Maintenance.

Chapter 19. Short report/description of the project (if any done during the training)

Chapter 20. Special/challenging experiences encountered during training if any (may include students liking & disliking of work places)

References /Bibliography

SUGGESTED LEARNING STRATEGIES

Students should visit the website of the industry where they are undergoing training to collect information about products, processes, capacity, number of employees, turnover etc. They should also refer the handbooks of the major machines and operation, testing, quality control and testing manuals used in the industry. Students may also visit websites related to other industries wherein similar products are being manufactured as their learning resource.

TENTATIVE WEEK-WISE SCHEDULE OF INDUSTRIAL TRAINING

The industrial training is a common course to all programmes; therefore the industry / Organization selection will depend upon the nature of programme and its related industry. The training activity may vary according to nature and size of Industry / Organization. The following table details suggestive schedule for industrial training for all programmes

Table - 2 Detail week schedule and Marks distribution

S. No.	Week No.	Details of activities to be completed during Industrial training	Marks distribution/ week for PA
1	Week No. 1	Induction to industry and its departments	05
		Study of layout and specifications of major machines, equipment and raw materials / components / software used.	05
		Study of setup ,processes/ milestone project.	
		Study of QA/QC procedures.	05
		Study safety and maintenance procedure in an industry/organization	
2	Week No. 2	Finalize the project work in consultation with the industry personnel/department .	05
		Gather the resources/literature etc. necessary for the accomplishment of the project.	05
		Build the project as per requirements.	10

3	Week No. 3	Report submission and completion certificate	05
PA marks to be given by industry supervisor			25
PA marks to be given by polytechnic faculty based on performance			10
Total PA marks for training			75

Table - 3 ASSESSMENT SCHEME FOR INDUSTRIAL TRAINING

Trainin g duratio n	PROGRESSIVE ASSESSMENT (Weekly report of all 4week and attendance)		END SEMESTER ASSESSMENT (Seminar and Oral)		Total marks	
	Max. marks	Min. marks	Max. marks	Min. marks	Max. marks	Min. marks
Six weeks	#75	-----	75**	30	150	60

**assessed by external examiner based on report (25 Marks), presentation (25 Marks) and Viva-Voce (25 Marks)

Table - 4 Distribution of End-Semester-Examination (ESE) marks of Industrial Training for Internal and External Examiners

Marks for Industrial Training Report	Marks for Seminar/ Presentation	Marks for Oral/Viva-voce	Total ESE marks
25	25	25	75

Format-1 : Information about Industry/Organisation for training

- 9) Name of the industry/organisation:
10) Address/communication details(incl email):
11) Contact person details:
 e) Name:
 f) Designation:
 g) Email
 h) Contact number/s:

12) Type:
 Govt / PSU / Pvt /
 Large scale / Medium scale / Small scale
13) Products/services offered by industry:

14) a) Whether willing to offer Industrial training facility during May/ June for Diploma in Engineering students: Yes / No.
 b) If yes, whether you offer 6 weeks training : YES/NO
 c) Internship capacity possible:

Programme	Civil Engg	Mechanical Engg	Electrical Engg	Total
Male					
Female					
Total					

- 15) Whether accommodation available for interns Yes / No.
 If yes capacity: _____

16) Whether internship is charged or free:
 If charged please specify amount per candidate: _____

Signature of responsible person:

Format-2 : Obtaining Consent Letter from parents/guardians
(Undertaking from Parents)

To,
The Principal,

_____ ,

Subject: Consent for Industrial Training.

Sir/Madam,

I am fully aware that -

- iii) My ward studying in _____ semester at your _____ institute has to undergo six weeks of Industrial training for partial fulfillment towards completion of Diploma in _____ Engineering.
- iv) For this fulfillment he/she has been deputed at _____ industry, located at _____ for internship of _____ weeks for the period from _____ to _____ .

With respect to above I give my full consent for my ward to travel to and from the mentioned industry. Further I undertake that –

- e) My ward will undergo the training at his/her own cost and risk during training and/or stay.**
- f) My ward will be entirely under the discipline of the organization where he/she will be placed and will abide by the rules and regulations in face of the said organization.**
- g) My ward is NOT entitled to any leave during training period.**
- h) My ward will submit regularly a prescribed weekly diary ,duly filled and countersigned by the training supervisor of the organization to the mentor faculty of the polytechnic.**

I have explained the contents of the letter to my ward who has also promised to adhere strictly to the requirements. I assure that my ward will be properly instructed to take his own care to avoid any accidents/injuries in the industry. In case of any accident neither industry nor the institute will be held responsible.

Signature :

Name : _____

Address : _____

Phone Number: _____

Format-3 : Student enrollment for In-plant training (To be design by programme department)

Sr. no.	Enrolment no.	Name,email id,Contact no.	Mentor, email id,Contact no.	Name of Industry,Adress, email id,Contact no.

Format-4: Issue Letter to the Industry/Organization for the training along with details of students and mentors

To,
The HR Manager,

Subject: Placement for Industrial training of ____ weeks in your organization....

Reference: Your consent letter no:

Sir,

With reference to the above we are honored to place the following students from this institute for Industrial training in your esteemed organization as per the arrangement arrived at.

Diploma programme in _____ Engg.

Sr. no.	Enrolment no.	Name:	Mentor

Kindly do the needful and oblige.

Thanking you in anticipation

Yours sincerely,

(Principal)
Name of the Institute with Seal

FORMAT-5
PA of Internship-I

Academic year : 20 -20

Name of the industry:

Sr. No.	Enrolment Number	Name of student	Marks				PA Marks by Industry Supervisor	PA based on Report by mentor faculty	Total
			Week 1(Out of 15)	Week 2(Out of 20)	Week 3(out of 05)	Total (A)(out of 40)	Out of 25 (B)	Out of 10 (C)	Out of 75 (A)+(B)+(C)

Marks for PA are to be awarded for each week considering the level of completeness of activity observed, from the daily diary maintained and feedback from industry supervisor.

Name of mentor:
Signature of mentor

Format-6: End of training assessment by mentor along with Industry/Organization expert as external examiner

Marks for Industrial Training Report	Marks for Seminar/ Presentation	Marks for Oral/Viva-voce	Total ESE marks
25	25	25	75

COURSE ID :

Course Name : POWER ELECTRONICS-II
Course Code : IEG 504
Course Abbreviation : GPE 2

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : IEG405

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	05
Practical/T.W.	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical */ Micro-project	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20 each	-	80	50I	150

Assessment as per Pro-forma IV

I-Internal examination

RATIONALE:

Over the years the design and construction of electronic devices and 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 non latching devices and different converters.

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:

- IEG504-1** Study fast switching devices based on their control facility in industrial aspects
IEG504-2 Identify various types of power conversion techniques in real life application
IEG504-3 Analyze and Select proper AC or DC voltage regulator.
IEG504-4 Use Inverters with multidisciplinary factors to solve industrial problems
IEG504-5 Apply basic principle of power electronics and power conversion techniques for various industrial application
IEG504-6 Use different protection circuits for safety.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Understand power electronics non latching devices and different converters.	1	1	1	1	-	-	-	3	3
IEG504-1	1	1	2	-	-	-	-	2	2
IEG 504-2	1	3	2	-	-	-	-	2	2
IEG 504-3	-	3	2	1	-	-	-	2	2
IEG 504-4	1	2	2	1	-	-	-	3	3
IEG 504-5	1	2	2	1	-	-	-	3	3
IEG 504-6	3	3	-	-	-	-	-	3	3

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.

CONTENT:

F) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any '10' experiments out of which microproject is compulsory).

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.	IEG504-1
2	Characteristics of IGBT.	i)To Analyze principal of operation of IGBT & characteristics of it. ii) To plot the characteristics	IEG504-1
3	Characteristics of MOSFET.	i)To Analyze principal of operation of MOSFET & characteristics of it ii) To plot the characteristics	IEG504-1
4	Study of step-up chopper	i)To Analyze principal of operation of step up chopper.	IEG504-2
5	Study of step-down chopper.	i)To Analyze principal of operation of step down chopper.	IEG504-2
6	Study of Morgans chopper.	i)To discover the working of Morgans chopper.	IEG504-2
7	Study of single phase to single phase cycloconverter	To discover the working of single phase to single phase cycloconverter	IEG504-2
8	Study of single phase to three phase cycloconverter	To discover the working of single phase to three phase cycloconverter	IEG504-2
9	Study of three phase to three phase cycloconverter	To discover the working of three phase to three phase cycloconverter	IEG504-2

10	Study of SMPS.	i)To study principal of operation of SMPS.	IEG504-3
11	Study of series inverter.	i)To Analyze principal of operation of series inverter.	IEG504-4
12	Study of parallel inverter.	i)To Analyze principal of operation of parallel inverter.	IEG504-4
13	Study of bridge inverter.	i)To Analyze principal of operation of parallel inverter.	IEG504-4
14	Study of UPS.	i)To understand principal of operation of UPS.	IEG504-5
15	Study of snubber circuit	i)To Analyze principal of operation of protection circuit.	IEG504-6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 2nd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- Build and test Chopper using UJT relaxation oscillator.
- Build and test Chopper using PUT relaxation oscillator.
- Construct and test transistorized inverter
- Build and test single phase to single phase cycloconverter
- Construct cycloconverters using thyristors.
- Inductor circuit breaker
- Simulation of any above project using MATLAB
- Any other than this list

G) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEG504-1 Study fast switching devices based on their control facility in industrial aspects			
1	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 parameters :-- 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	08	12
IEG504- 2 Identify various types of power conversion techniques in real life application			
2	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 Quadrant of operation single quadrant ,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	08	16

IEG504-3 Analyze and Select proper AC or DC voltage regulator.			
3	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	08	12

Section II

Sr. No.	Topics	Teaching hours	Marks
IEG504-4 Use Inverters with multidisciplinary factors to solve industrial problems			
4.	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	10	18

	4.7 List of applications. 4.8 Specifications.		
IEG504-5 Apply basic principle of power electronics and power conversion techniques for various industrial application			
5	Industrial applications 5.1 Induction heating 1.5.5 Principle ,theory 1.5.6 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 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.	08	10
IEG504-6 Use different protection circuits for safety.			
6.	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	06	12
	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:

Sr. No.	Name Of the Topic	Distribution Of Marks (Level Wise)			Course Outcome	Total Marks
		Knowledge	Comprehension	Applications		
I/1.	Non Latching Devices:	02	04	06	IEG504-1	12
I/2	Chopper (Dc to dc converter.	04	06	06	IEG504-2	16
I/3	AC & DC voltage regulator	04	04	04	IEG504-3	12
II/1	DC to AC converter(inverter)	08	06	04	IEG504-4	18
II/2	UPS	02	04	04	IEG504-5	10
II/3	Protection circuits	02	04	06	IEG504-6	12
	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						

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

h) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/ Algorithm/ flowchart	05
	Observation/ Logic/ Program/ Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 X*.

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

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma X*

i) **Assessment Criteria for Term-end Practical Examination:**

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	Technical ability	10
2	Correct figures / diagrams/ Logic	10
3	Observation table/ Algorithm/ flowchart/ Program	10
4	Correctness of - Result / Output / Calculations / Graphs	10
5	Safety / Use of proper tools / overall Decency & Presentation / Workmanship	10
	Total	50

**Assessment at*

practical exam as per Pro-forma I.

semester end

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.PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Journals / IS 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
4	Rashid ,Muhammad H	Power Electronics circuir,Devices & Applications	Pearson Education India

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 : IEG 505
Course Abbreviation : GPLC

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		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	25I	125

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

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:

Maintain industrial automation circuitry based on PLC.

Cognitive : Select specific PLC and provide solution for wide range of application.

Psychomotor : Maintain and operate PLC for wide range of industrial applications.

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

COURSE OUTCOMES:

IEG 505-1 Identify various components PLC and illustrate their function

IEG 505-2 Select PLC input and output modules as per need of application

IEG 505-3 Identify and use different types of instructions set in PLC.

IEG 505-4 Develop ladder diagrams for various simple applications

IEG 505-5 Develop ladder diagrams for various advanced industrial and engineering applications

IEG 505-6 Install and Troubleshoot PLC

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Maintain industrial automation circuitry based on PLC.	-	3	3	3	2	1	1	3	3
IEG 505-1	-	1	2	-	-	-	1	2	2
IEG 505-2	-	2	2	2	-	-	-	2	2
IEG 505-3	-	2	2	2	-	-	-	2	2
IEG 505-4	-	3	3	3	2	2	-	3	3
IEG 505-5	-	3	3	3	2	2	-	3	3
IEG 505-6	-	2	2	2	-	-	2	3	3

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.

CONTENT :

H) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 out of 15 experiments).

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.	IEG 505-1
2.	Logic gates by using PLC.	Write and Verify truth table of Logic gates by execution of ladder program	IEG 505-4
3.	Boolean Algebra	Verify Boolean equations by execution of ladder program	IEG 505-4
4.	Blinking of LED's	Write and verify ladder program for blinking by using timer.	IEG 505-5
5.	Sequential ON-Off control of Lamps	Write and verify ladder program for traffic signal control for two directions	IEG 505-4,5
6.	Elevator Control	Write and verify ladder program for elevator control	IEG 505-4,5
7.	Tank Level controller	Write and verify ladder program for tank level control	IEG 505-4,5
8.	Counters for pulse counting using limit switch/ proximity sensor	Write and verify ladder program for object counter using counter	IEG 505-4,5
9.	Analog sensor interfacing with PLC.	Write and verify ladder program for any analog sensor such as RTD, thermocouple, thumbwheel switch, etc	IEG 505-4,5
10.	AC Motor control by VVFD	Write, verify and control speed of any AC motor available by using VVFD	IEG 505-4,5
11.	DC Motor Control	Write, verify and control speed of any AC motor available.	IEG 505-4,5
12.	Automated car parking system.	Develop /test ladder program for automated car parking system.	IEG 505-3,5
13.	Stepper motor rotation	Develop / test ladder program for rotating stepper motor in forward and reverse direction at constant speed.	IEG 505-3,5
14.	SCADA Simulator	Use various functions of SCADA simulator editor to develop simple program	IEG 505-6
15.	Tank level controller mimic diagram using SCADA	Develop a SCADA mimic diagram for Tank level control.	IEG 505-6

A.2 Micro-project

Each student should be allotted one microproject in the beginning of the semester. In 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs.

Each student has to maintain a dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

- Automatic street light controller:** Prepare a PLC based system to control the street light as per the intensity of natural light.
- Automatic agriculture irrigation system:** Prepare a PLC based system to control drip irrigation.
- Railway gate automation:** Prepare a PLC and SCADA based system to open or close the prototype railway gate automatically.
- Home automation:** Implement the versatile automation system for home that can automate any three home appliances.
- Bottle filling station:** Prepare a PLC and SCADA based system for prototype bottle filling station.
- Troubleshoot the Fault Equipment/Kit available in automation Laboratory.

I)THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
IEG 505-1 Identify various components PLC and illustrate their function			
1	PLC Fundamentals 1.1 Evolution and Role of PLC in Automation 1.2 Advantages and disadvantages of PLC 1.3 Different systems for Industrial automation: PLC, HMI, SCADA, DCS, Drives 1.4 PLC Classification based on Type and Size: Fixed PLC and Modular PLC (nano/pico , mini, micro, medium, large) 1.5 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)	09	14

	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		
IEG 505-2 Select PLC input and output modules as per need of application			
2.	PLC Hardware 2.1 Discrete input modules: 2.1.1 Block diagram, 2.1.2 Typical wiring details. 2.1.3 Sinking and sourcing concept in DC input modules. 2.1.4 Specifications of AC input modules & DC input module 2.2 Discrete output modules: 2.2.1 Block diagram description, 2.2.2 Typical wiring details 2.2.3 Specifications of AC output module & DC output modules. 2.3 Analog input and output modules: 2.3.1 Block diagram, 2.3.2 Typical wiring details 2.3.3 Specifications 2.4 Sinking and sourcing Output Module 2.5 I/O module selection criterion	06	12
ETG 511-3 Identify and use different types of instructions set in 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.	09	14
	Sub-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)
IEG 505-4 Develop ladder diagrams for various simple applications			
4	PLC Programming 6.1 Different PLC programming languages (only introduction) - FBD, Instruction list, structured text, sequential Function chart, and ladder logic. 6.2 Ladder Programming for logic functions 6.3 PLC ladder programming for Boolean Algebra 6.4 Simple programming examples using ladder programming language based on relay, timer, counter, logical, comparison, Data handling and Miscellaneous instruction. 6.5 Programming based on analog sensor such as ADC, thumbwheel switches, RTD/thermocouple	09	14
IEG 505-5 Develop ladder diagrams for various advanced 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 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	09	14
IEG 505-6 Install and Troubleshoot PLC			
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	06	12

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	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 6.3 Introduction to SCADA systems 6.3.1 Introduction to SCADA, typical SCADA architecture/block diagram, benefits of SCADA 6.3.2 Various editors of SCADA		
	Sub-Total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Applica-tion		
1	PLC Fundamentals	4	4	6	IEG 505-1	14
2	PLC Hardware	4	4	4	IEG 505-2	12
3	PLC Instruction Set	2	6	6	IEG 505-3	14
4	PLC Programming	2	2	10	IEG 505-4	14
5	PLC Applications	-	4	10	IEG 505-5	14
6	PLC installation and Troubleshooting	2	4	6	IEG 505-6	12
	TOTAL	14	24	42		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05

Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 IV*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

iii) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3.PPTs 4. Question 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
- 5) Software:- www.fossee.com
- 6) Software:- www.logixpro.com
- 7) Software:- www.plctutor.com
- 8) Software;-www.ellipse.com
- 9) PLC lecture:- <https://www.youtube.com/watch?v=pPiXEf8O2qo>
- 10) PLC tutorial:-[http://users.isr.ist.utl.pt/jag/aulas/apil3/docs/API I C3 3 ST.pdf](http://users.isr.ist.utl.pt/jag/aulas/apil3/docs/API%20I%20C3%203%20ST.pdf)

COURSE ID:

Course Name : Project-II
Course Code : EIG 506
Course Abbreviation : GPR2

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : <EIG 404>

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	0	4
Practical	4	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical	
Marks	--	--	--	75E	75

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

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 course ‘Project II’ is the continuation of the previous semester course on ‘Project-1’. So, in this semester, the students are to implement the detailed Project Plan, which they have prepared in the preceding semester. This subject is essential to understand the implementation of the system development process i.e. analyze, design, coding, debugging and testing.

COMPETENCY:

Implement the Project Plan to solve the identified problem/task faced by industry/user by integrating the various types of skills acquired during the programme.

Cognitive: Take appropriate decisions based on collected and analysed information.

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:

EIG 506-1 Implement the planned activity individually and/or as team..

EIG 506-2 Select, collect and use required information/knowledge to solve the problem/complete the task.

EIG 506-3 Troubleshoot the hardware and software of designed system.

EIG 506-4 Communicate effectively and confidently as a member and leader of team.

EIG 506-5 Prepare and present project proposals/project/seminar report.

EIG 506-6 Ensure the quality of product and assess impact on society(if any).

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Plan innovative/creative solutions to solve/complete the identified problems/task/shortcomings	-	2	3	2	2	3	1	3	3
EIG 506-1	-	2	2	-	2	-	-	-	2
EIG 506-2	-	2	3	2	-	1	-	1	2
EIG 506-3	-	2	3	2	2	2	-	2	3
EIG 506-4	-	-	-	-	-	2	-	3	3
EIG 506-5	-	1	2	2	-	1	-	2	2
EIG 506-6	-	2	1	-	2	-	1	-	-

COURSE DETAILS:

The students should revise the Project - Plan' based on the feedback received in the fifth semester examination.

This revised 'Project - Plan' would be again approved by the project guide. As soon as the revised plan is approved by the teacher, the student will begin to work according to it and would also continue to maintain a dated '*Project Diary*' for the whole semester. This is a sort of a 'weekly diary' indicating all

the activities conducted by the student every week in the semester to complete the project. This 'Project Diary' should be got signed by the teacher at regular intervals for progressive assessment. If this is maintained sincerely and truthfully by the student, it will be very helpful in compiling the **Final Project Report** at the end of the semester by him/her.

GUIDELINES FOR UNDERTAKING THE PROJECT:

(i) Project activity calendar should be prepared by project co-ordinator and should be displayed to students w.r.t following points.

Students are advised to plan their project work w.r.t following stages

Stage	Major Learning Activities	Description of Activity
Stage-I Create PCB/Write Program Codes	a) Build actual PCB from the PCB layout design. b) Identify components and assure their ratings c) Write actual code from algorithm	1.1 Physical creation of Printed Circuit Board 1.2 Verification of Component ratings and specifications 1.3 Develop the flowchart for program and write the code.
Stage- II Component Mounting and soldering/rectification of syntax errors	a) Check all tracks for continuity b) Mount and solder components on PCB c) Run program modules and check for syntax errors	2.1 Continuity test for PCB tracks 2.2 Mounting and Soldering component on PCB 2.3 Execute program modules and debugging for syntax errors
Stage- III Software Testing and Loading/ Hardware Test	a) Unit Testing of software b) Program testing c) Loading program on chip/ on system	3.1 Debug system modules for logical errors 3.2 Test program as a whole after linking modules to main program 3.3 Test program and load on chip/on system 3.4 Test Hardware circuit if software is not there in scope of project
Stage – IV Final Implementation	a) Execute program b) Test for various inputs c) Troubleshoot final hardware/software	4.1 Execute loaded program on actual hardware and observe response. 4.2 Test hardware behavior for all possible inputs to the circuit. 4.3 Troubleshoot hardware/software for unexpected/faulty behaviour 4.4 Correct Hardware/software and execute the program until getting desired/expected response.
Stage – V Model design	5.a. Prepare model design 5.b. Create model 5.c. Test Model	5.1 Design model and 5.2 Create list of requirement for implementation of model 5.3 fabricate and construct model Connect circuit responses to model and test model for its working

STAGE – 6 Documentation and presentation	j) Prepare project report. k) Prepare PPT presentation Present project work	6.1 Prepare project report as per prescribed format given by department/guide. 6.2 Prepare PPT and present as per schedule. 6.3 Demonstrate with model
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(ii) Project report:

At the end of sixth Semester, the student will prepare a Project Report with the following sub-titles:

- Title page (with name of team members and mentor teacher)
- Certificate (in the Format given as per departement)
- Acknowledgements (this may need revision at the end of the final semester)
- Abstract (in one paragraph not more than 150 words)
- Content Page
- Chapters
 - Chapter-I Introduction (background of the Industry or User based Problem/Task)
 - Chapter-2 Literature Survey (to finalise and define the Problem Statement)
 - Chapter-3 Scope of the project
 - Chapter-4 Methodology
 - Chapter-6 Results and Applications
 - Chapter-7 Conclusions and future scope
- Appendix (if any)
- References and Bibliography

The report should contain as many diagrams, figures and charts etc as relevant for the project.

Originality of the report (written in own words) would be given more importance rather than quality of printing and use of glossy paper or multi-colour printing.

Continous Assessment (CA) Guidelines and Criteria

Project guide is supposed to carry out this assessment. It is a continuous process, during which for developing desired qualities in the students, faculty should orally give **informal feedback** to students about their performance and interpersonal behaviour while guiding them on their project work every week. Following criteria should be considered while assessing students informally or formally during different stages of the project work.

The following factors need consideration for both Project-1 and Project-2 .Report Writing.

- a) Students should be assessed during the project work so that students can also get feedback for further improvement.
- b) It should be kept in mind that project work is mainly experiential learning and it is not the research work, so emphasis should be on work based learning or learning from experience and development of attitudes and skills as mentioned in course outcomes. So focus of assessment should also be on learning from the process of completing project work rather than on novelty or innovation in the project work.
- c) For continous assessment at the end, students should be asked to give the power point presentation before group of teachers and junior students (so that junior students may also get awareness about the major project work they have to carry out in future)
- d) The students would be awarded marks for their efforts (In some cases it may happen that

due to some reasons such as unavailability of some material or component or some other resources, students may not be able to complete the project, but they have tried their best, in such cases students would be given appropriate marks if they have done enough efforts.)

- e) The students would not be awarded marks if they have completed the project by getting done the work from market or some professionals (taking some help and guidance is different as compared to getting the work or maximum part of the work completed from others on payment basis).
- f) Originality of the report (written in own words) would be given more importance.
- g) The Project Guide will assure the quality of project done by his group.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

iv) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Problem Identification/Project title.	05
	Project diary	
Psychomotor	Implementation Hardware/Software Designing	15
	Report Writing and documentation	
Affective	Punctuality and overall contribution	05
	Decency and presentation	
TOTAL		25

ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted in the form of demonstration of work done per criteria given

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

Sr. No.	Criteria	Marks allotted
1	Project synopsis/ Problem Identification	05
2	Implementation Hardware/Software Designing	10
3	Project diary and documentation	05
4	Punctuality and overall contribution	05
5	Presentation, Question and Answer	
	Total	25

**Final marks of PST shall be awarded as per Assessment Pro-forma I*

v) Term-end Oral Examination :

Evaluation shall be carried out according to following criteria. For each project, students from the concerned group should be asked to make presentation of their project , in front of the external and internal examiners which should be followed by question answer session to ascertain the contribution made by each student.

Every student shall be assessed by internal examiner and external as per the following criteria:

Domain	Particulars	Marks out of 25
Cognitive	Problem synopsis/proposal	05
Psychomotor	Implementation of Hardware & Software	10
	Project Report and documentation	05
Affective	Punctuality and overall contribution	05
	Presentation, Question and answer	05
TOTAL		25

REFERENCE MATERIAL:

i) 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

j) Websites:

- a. www.efy.com
- b. www.electronicshub.org
- c. www.datasheet.com
- d. <http://www.electronicshub.org>
- e. <http://www.engineersgarage.org>
- f. <http://www.electronics-project-design.com>
- g. <http://www.eleccircuit.com>
- h. <http://www.circuit-projects.com>
- i. <http://www.electronicproject.org>
- j. <http://www.circuiteasy.com>
- k. <http://www.electronics-project-design.com>
- l. <http://www.electronicsschematic.com>

k) Magazines:

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

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
4.	-	-							
5.	-								
6.	-								

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:

S N	Activity	Details	Date of completion
1.	Finalization of students' groups and assignment of project guide to newly entered group/students if any (Performa P-2)	Policy to be decided by programme department	
2.	Create PCB/WriteProgram Codes	Building PCB and purchasing components	
3.	Software Testing and Loading/ Hardware Test	Testing hardware and software.	
4.	Demonstration-1 (term-1 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
5.	Demonstration-2 (mid-term-2 end) (Performa P-5)	PowerPoint presentation to be assessed as per prescribed rubrics	
6.	Presentation of final project report (Performa P-3 & P-6)	<ul style="list-style-type: none">• 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:**

5. Cover page
6. Index
7. Project Sheet
8. Activity schedule for project work

Name and signature of Project Guide

Name and signature of Programme Dean

Performa P-2

FINALIZATION OF PROJECT GROUPS, TOPICS AND GUIDES

Programme :

Academic Year :

Class :

Date :

S N	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.						
...						

GOVERNMENT POLYTECHNIC, KOLHAPUR
(An Autonomous Institute of Government of Maharashtra)

Performa P-3
ASSESSMENT RUBRICS FOR PROJECT REPORT

Programme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide :

Date :

S N	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 >>													

Project Guide

Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

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

Programme : Academic Year : Title
of Project :

Project Group ID : Name of Project Guide : Date :

S N	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 >>													

Project Guide

Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

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

Programme :

Academic Year :

Title of Project :

Project Group ID :

Name of Project Guide :

Date :

S N	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 >>													

Project Guide

Programme Dean

GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Performa P-6 ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECT

Programme :
Title of Project :

Academic Year :

Project Group ID :

Name of Project Guide :

Date :

S N	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 >>													

Project Guide

Programme Dean

COURSE ID:

Course Name : CONSUMER ELECTRONICS
Course Code : EIG507
Course Abbreviation : GCEN

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : NIL

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	25I	125

* I-Internal Assessment *Assessment at semester end practical exam as per Pro-forma 2.

RATIONALE: In delivering country's demand of consumer electronic appliances is increasing day by day. This requires large number of technically trained man power in the relevant industries .Looking towards the present need, in depth knowledge for maintaining various consumer electronic appliances/equipment is necessary for diploma engg. pass out students. This course will introduce the students with working principles, of consumer electronic appliances like audio video systems, microwave oven ,washing machine, air conditioner,camcordnerand others to develop skills to troubleshoot in systematic way. Knowledge so gained help in production units of these consumer gadgets or help the students to start their own enterprises.

COMPETENCY:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.

Cognitive: Understand various audio/video systems from the application point of view

Psychomotor: Implement industry oriented application based audio/video systems.

Affective: Attitude of i) Maintain and troubleshoot various audio systems .

COURSE OUTCOMES:

EIG507-1 Troubleshooting different types of microphones and speakers.

EIG507-2 Maintain audio systems.

EIG507-3 Analyze the composite video signal used in TV signal transmission.

EIG507-4 Troubleshoot color TV Transmitter.

EIG507-5 Troubleshoot color TV receivers.

EIG507-6 Maintain various consumer electronic appliances.

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: to help the student to attain the following industry identified competency through various teaching learning experiences.	2	2	3	2	1	1	-	2	3
EIG507-1	1	2	3	-	-	-	-	2	2
EIG507-2	1	3	2	-	-	-	-	2	2
EIG507-3	-	3	3	1	-	-	-	2	2
EIG507-4	1	2	3	1	-	-	1	3	3
EIG507-5	1	2	-	2	-	-	1	3	3
EIG507-6	-	1	2	2	-	-	2	2	3

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.

CONTENT:

A) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10/20 out of 15/25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
--------	-----------------------------	---------------------------------------	----------------

1.	Test the performance of the given microphone.	1) Understanding first the type of microphone given. 2) Checking performance of various parameters . 3) Comparing them with the standard values of parameters.	EIG507-1
2.	Test the performance of the given speaker.	1)Identifying the type of speaker given. 2)Checking performance for various parameters. 3)Comparing them with the standard values of parameters.	EIG507-1
3.	Test output voltage and power of the Hi-Fi amplifier.	1)Using proper set up check voltage 2)Using proper set up check the power.	EIG507-3
4.	Identify any three different faults by voltage analysis method for Hi-Fi audio amplifier.	1)Locating fault at different stages of amplifier.	EIG507-3
5.	Select exact speed to write a CD for given type of data.	1)To check different speeds and selecting appropriate speed for writing 2)Above procedure should be repeated for different data types.	EIG507-3
6.	Install/test the CD for given type of data.	1)Installing the CD for given type of data 2)Testing the CD for given type of data	EIG507-3
7.	Measure voltage levels to sketch composite video signal at different stages of receiver.	1)Measuring voltage levels at different stages. 2)Sketching composite video signal from acquired voltages at different stages.	EIG507-5
8.	Use multimeter to measure voltage at various test points of colour TV receiver a) chroma section b)picture tube	1)Measuring voltages at chroma section 2)Measuring voltages at picture tube.	EIG507-5
9.	Use multimeter to test voltages at various test points of the horizontal section of colour TV receiver.	1)Divide horizontal section in to different parts 2)Measuring voltages at different points.	EIG507-5
10.	Use multimeter to test voltages at various test points of the vertical section of color TV receiver.	1) Divide vertical section in to different parts 2) Measuring voltages at different points.	EIG507-5

11.	In the given color TV trainer kit ,suggest the remedy for the created fault. Faults are 1)No colour 2)Red colour only 3)Green colour only 4)No sound	1)Prepare flow chart with steps to troubleshoot 2)follow the steps for each fault and remove the fault.	EIG507-4
12.	Suggest the remedy for the given faults in the color TV a)Fault in HSYNC section b)Fault in video amplifier.	1)Prepare flow chart with steps to troubleshoot 2)follow the steps for each fault and remove the fault.	EIG507-4
13.	Suggest the remedy for the given faults in the color TV a)Fault in SYNC separator b)Fault in VSYNC section.	1)Prepare flow chart with steps to troubleshoot 2)follow the steps for each fault and remove the fault.	EIG507-5
14.	Test the various sections of the LED television receiver.	1)Measure voltages at different points 2)locate the fault if any 3)Take remedial action.	EIG507-5
15.	Test the various features of the given type of the printer.	1)Test the various sections of the printer 2)Measure the voltages	EIG507-6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of micro projects is as follows:

- a) Battery Charger: Build a battery charger for mobile phone. Prepare a report.
- b) FM Radio Receiver: Build FM radio receiver using IC TEA 5591.
- c) Installation of DTH: Install DTH indoor and outdoor unit.
- d) Up Down counter: Build a circuit for 2 digit Up down counter at gates of a mall/parking space. Prepare a report.
- e) Timer delay: Build a timer delay using IC 89C51.
- f) Gas leakage detector: Develop a circuit for LPG gas detector. Prepare a report.
- h) Light ON OFF control: Develop a circuit for light ON OFF control using mobile app and Bluetooth. Prepare a report.
- g) Smoke detector circuit: Build a smoke detector circuit for office/hospitals.
- h) Bar code reader: Build a bar code reader circuit for malls/super markets.

B) THEORY :

SECTION-I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG507-1 Troubleshooting different types of microphones and speakers.			
1	Audio Fundamentals 1.1 Basic characteristics of sound signal: level and loudness, pitch and frequency response, fidelity, sensitivity and selectivity. 1.2 Audio amplifiers: Mono, Stereo 1.3 Microphone: working principle and characteristics. Types: carbon, condenser, crystal, electret and tie clip. 1.4 Speakers: working principle and characteristics, types: electrostatic, dynamic, permanent magnet etc. woofers, tweeter and mid range wireless 1.5 Troubleshooting procedure.	06	12
EIG507-2 Maintain audio systems.			
2	Audio systems. 2.1 Block diagram and operation of CD player. Types of CD player. 2.2 Components used for CD mechanism: CD pick up assembly, gear system, drive motors, CD lens. 2.3 Block diagram and working of Hi Fi amplifier. 2.4 Public Address (PA) system: Block diagram and operation, speaker impedance matching and characteristics. 2.5 Home theatre system. 2.6 Block diagram and working of MP3. 2.7 Troubleshooting procedure of audio systems.	08	14
EIG507-3 Analyze the composite video signal used in TV signal transmission			
3	Television Fundamentals 3.1 Concept: Aspect ratio, image continuity 3.2 Interlace scanning, scanning periods: horizontal and vertical scanning. 3.3 Vertical and horizontal resolution. 3.4 Vestigial Sideband transmission, bandwidth for colour signal. 3.5 Characteristics of color signal and compatibility. 3.6 Color theory, Grassman's law, additive and	10	14

	subtractive color mixing,		
	SUB-	24	40
	TOTAL		

SECTION-II

Sr. No.	Topics	Teaching hours	Marks
EIG507-4 Troubleshoot color TV Transmitter.			
4.	TV Transmitter 4.1 CCIR-B standards for color signal transmission and reception. 4.2 positive and negative modulation, merits and demerits of negative modulation. 4.3 composite video signal-pedestal height, blanking pulse, color burst, Horizontal sync pulse details, equalizing pulses. 4.4 Block diagram of color TV transmitter. 4.5 Troubleshooting procedure of color TV transmitter.	08	14
EIG5075-5 Troubleshoot color TV receivers.			
5	Television Receivers. 5.1 Block diagram and operation of color TV Receiver. 5.2 Operation of PAL-D decoder. 5.3 HDTV: Development of HDTV, NHK MUSE system and NHK broadcast. 5.4 LCD/LED technology: principle and working of LCD and LED TV. 5.5 Direct to Home Receiver(DTH): Concept, receiver block diagram, indoor and outdoor unit. 5.6 Troubleshooting procedure of color TV receiver. 5.7 Block diagram and working of OLED.(Organic)	08	12
EIG507-6 Maintain various consumer electronic appliances			
6	Consumer electronic appliances. 6.1 Photocopier block diagram and working. 6.2 Microwave oven: Types, single chip controllers, block diagram, types, specifications, and wiring and safety instructions. 6.3 Washing machine: Block diagram and working, electrical	08	14

	specifications, types: automatic and semi-automatic.		
	6.4 Digital camera and cam coder: pick up devices, picture processing and picture storage, and electrical specifications.		
	Sub- Total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Audio Fundamentals	04	06	02	EIG507-1	12
2	Audio systems	04	06	04	EIG507-2	14
3	Television Fundamentals	04	06	04	EIG507-3	14
4	TV transmitter	06	04	04	EIG507-4	14
5	Television receivers	02	04	06	EIG402-4	12
6	Consumer electronic appliances.	04	06	04	EIG507-6	14
	Total >>	24	32	24		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

a) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/	05

	Presentation	
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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma X.*

Sr. No	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

b) Assessment Criteria for Term-end Practical Examination:

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

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3. PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Bali S. P.	Consumer Electronics	Pearson education India, Delhi; 2007; ISBN: 9788131717592.
2.	Gupta R. G.	Audio video systems principles, maintenance and troubleshooting.	Tata Mcgraw Hill, 2010 ; ISBN: 9780070699762
3	Dhake A. M.	Television and video engg.	Tata Mcgraw Hill, India; ISBN: 0-07-460105-09
4	Gulati R. R.	Modern television practice: Transmission, reception and applications	New Age International; New Delhi; 2015; ISBN: 978-81-224-3784-3

b) Websites:

- i. Microphone: <http://www.coursehero.com/file/18404103/7-microphoneppt/>
- ii. CD player: www.tcauset.org/cpg132/albums/FTPupLoads/PPT_05/CDs_speroS.ppt
- iii. Microwave oven: www.calvin.edu/~pribeiro/course/engr302/Samples/Microwave.ppt
- iv. www.sharpthai.co.th/backoffice/img/download.../ES-D159T-SLWH%20ENG.pdf
- v. Photocopier machine: www.youtube.com/watch?v=NxUbPE8RsiM
- vi. Color TV theory: <http://www.slideshare.net/PravinShirke07/colour-television>
- vii. Television: <http://www.slideshare.net/PravinShirke07/colour-television/shallman-533704>

* * *

COURSE ID:

Course Name : INSTRUMENTATION
Course Code : EIG508
Course Abbreviation : GINS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	03	5
Practical	02	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical */ Micro-project	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	25I	125

* E-External Assessment *Assessment at semester end practical exam as per Pro-forma IV

RATIONALE:

In industry engineering diploma holders (also called technologists) are expected to handle basic instruments for the measurement of various process parameters such as temperature, pressure, flow and level in different types of industries. The technologists should be able to select proper instruments for the measurement of above parameters and also maintain these instruments for proper functioning in different application. This course will be helpful to the students in understanding this knowledge and acquiring this skill used for measurement of complicated parameters.

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:

COURSE OUTCOMES:

EIG508-1 Differentiate among variety of transducers based on their features.

EIG508-2 Acquire temperature measuring transducers and temperature measuring methods.

EIG508-3 Acquire level measuring transducers.

EIG508-4 Use of different types of pressure transducer and acquire pressure measuring and flow Measuring different transducers.

EIG508-5 Describe different data transmission methods and telemetry systems.

EIG508-6 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Acquiring skills used for measurement of complicated parameters using different transducers	2	2	-	-	-	-	-	-	-
EIG508-1	2	-	-	-	-	-	-	-	-
EIG508-2	2	-	-	-	-	-	-	1	1
EIG508-3	2	3	-	-	-	-	-	2	2
EIG508-4	2	3	-	-	-	-	-	1	1
EIG508-5	2	-	-	-	-	-	-	1	-
EIG508-6	2	-	-	-	-	-	-	-	-

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.

CONTENT:

J) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 'X' experiments).

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	EIG508-2

2.	To plot the characteristics of RTD	1. Connect power supply 2. Know the front panel 3. Plot the characteristics of RTD	EIG508-2
3.	To plot the characteristics of Thermistor	1. Connect power supply 2. Know the front panel 3. Plot the characteristics of Thermistor	EIG508-2
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	EIG508-1
5.	Study of primary and secondary transducer using bourdon tube and LVDT	1. Connect power supply 2. Know the front panel 3. Measure the linear displacement	EIG508-3,1
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	EIG508-4
7.	To Study of Single channel Data acquisition system with analog output.	1. Connect power supply 2. Know the front panel 3. Measure the Temperature	EIG508-6
8.	To Study of Single channel Data acquisition system with digital output.	1. Connect power supply 2. Know the front panel 3. Measure	EIG508-6
9.	To Study of Multichannel Data acquisition system with digital output. (minimum two physical parameter)	1. Connect power supply 2. Know the front panel 3. Measure	EIG508-6
10.	Study of level measurement using capacitive transducer	1. Connect power supply 2. Know the front panel 3. Measure the Capacitive level	EIG508-5
11	Use the potentiometer to measure the linear displacement	1. Connect power supply 2. Know the front panel 3. Measure the linear displacement	EIG508-1
12	Flow measurement using Variable head flow meter	1. Connect power supply 2. Know the front panel 3. Measure the flow	EIG508-3
13	Use Venturi meter for flow measurement	1. Connect power supply 2. Know the front panel 3. Measure the flow using Venturi meter	EIG508-4
14	Use Orifice plate meter for flow	1. Connect power supply	EIG508-

	measurement	2. Know the front panel 3. Measure the flow using Orifice plate meter	4
15	Study of signal conditioning circuits using any physical parameter at input	1. Connect power supply 2. Know the front panel 3. Measure	EIG508-6

A.2 Micro-project

Each student should allotted one micro project in the beginning of the semester. In 2nd and 4th semester the micro projects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each micro project should encompass two or more COs. Each student has to maintain dated work diary consisting of individual contribution in the micro project work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of micro projects is as follows:

- Micro project 1 title :-Use RTD for indication of temperature.
- Micro project 2 title:-Use Thermistor for indication of temperature.
- Micro project 3 title:-Use level transducer for indicating and controlling the level of water tank.
- Micro project 4 title:-Use float type level sensor for indication of level of water tank.
- Micro project 5 title:-Use pressure transducer for indicating and controlling the compressor utility system.
- Micro project 6 title:-Use strain gauge for weight measurement simple platform.

K) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>EIG508-1 Differentiate among variety of transducers based on their features</i>			
01	Transducers 1.1 Block Diagram of Electronic Instrumentation system 1.2 Transducers: Definition of Transducer, definition of Sensor, Need of transducers Classification-Active and Passive, Analog and Digital, Primary and Secondary, Mechanical and Electrical. 1.3 Electrical Transducers 1.3.1 Resistive Transducers-Linear and Rotational potentiometer	08	14

	<p>1.3.2 Strain gauge:-Operating Principle</p> <p>1.3.2.1 Types of Strain gauge</p> <p>1.3.2.1.1 Bonded Strain gauge</p> <p>1.3.2.1.2 Unbonded Strain gauge</p> <p>1.3.2.1.3 Comparison between Bonded and Unbonded Strain gauge</p> <p>1.4 Capacitive Transducer</p> <p>1.4.1 Transducer using variation in area of plates</p> <p>1.4.2 Transducer using variation in distance between two plates</p> <p>1.5 Inductive Transducer</p> <p>1.5.1 LVDT</p> <p>1.6 Selection Criteria for Transducers:-Operating range, Operating Principle, Sensitivity, Accuracy, Frequency response and resonant frequency, Errors</p>		
<i>EIG508-2 Use temperature measuring transducers and temperature measuring methods.</i>			
02	<p>Temperature measurement</p> <p>2.1 Definition of Temperature</p> <p>2.2 Temperature scales and conversion</p> <p>2.3 Electrical Methods of temperature measurement</p> <p>2.3.1 Resistance thermometer (PT100) or Resistance Temperature Detector (RTD):-Operating principle, construction and working</p> <p>2.3.2 PT100-Operating range, advantages, disadvantages, application</p> <p>2.4 Thermistors-Operating principle, construction and working</p> <p>2.4.1 PTC and NTC</p> <p>2.4.2 Comparison between NTC and PTC</p> <p>2.5 Thermocouple: Principle, construction and working</p> <p>2.5.1 Seebeck effect</p> <p>2.5.2 Peltier effect</p> <p>2.5.6 Types of Thermocouples (J, K, R, S and T) based on Materials and Temperature</p> <p>2.6 Pyrometers .</p> <p>2.6.1 Radiation pyrometer:- Principle, construction, working, advantages, disadvantages, application</p> <p>2.6.2 Optical pyrometer:- Principle, construction, working, advantages, disadvantages</p>	10	14

	s,application		
<i>EIG508-3 Use level measuring transducers.</i>			
03	Level Measurement 3.1 Definition of Level 3.2 Classification of Level measurement method 3.3 Direct Method 3.3.1 Float Type Method (Contact Type) 3.4 Indirect Method:-Electrical Type 3.4.1 Capacitance level detector (Contact Type) 3.4.2 Ultrasonic Level measurement (Non- Contact Type)	06	12
	Sub total	24	40

Section II

Sr. No .	Topics	Teaching hours	Marks
<i>EIG508-4 Use of different types of pressure transducer and acquires pressure measuring and flow measuring different transducers.</i>			
04	Pressure & Flow measurement 4.1 Definition of Pressure and its Unit 4.2 Classification of Pressure measuring Transducers 4.2.1 Mechanical Elastic Pressure Transducers 4.2.1.1 Bourdon Tube 4.2.1.1.1 C type Bourdon Tube 4.2.1.1.2 Helical Tube 4.2.1.2 Diaphragm 4.2.1.2.1 Metallic diaphragm gauge 4.2.1.3 Bellows 4.3 Definition of Flow 4.4 Types of Flow 4.4.1 definition Laminar Flow with diagram 4.4.2 definition Turbulent Flow with diagram 4.4.3 Comparison between Laminar and Turbulent Flow 4.5 Classification of flow meter 4.5.1 Variable head flow meter 4.5.1.1 Venturi meter 4.5.1.2 Orifice plate meter 4.6 Electrical flow meter 4.6.1 Electromagnetic flow meter 4.6.2 Ultrasonic flow meter	12	14

<i>EIG508-5 Describe different data transmission methods and telemetry systems.</i>			
05	Data Transmission & Telemetry 5.1 Methods of Data transmission 5.2 Introduction to Telemetry, Block diagram of General Telemetering System 5.3 Types of Telemetry system 5.4 Transmission channels & media 5.5 Wire line channels 5.6 Radio channels 5.7 Microwave channels 5.8 Power line carrier	06	12
<i>EIG508-6 Develop proper signal conditioning circuit and use proper data acquisition system.</i>			
06	Signal conditioning and Data Acquisition System 6.1 Introduction of Signal conditioning 6.2 Signal conditioning block diagram- AC & DC 6.3 Amplifiers- Chopped & modulated amplifier, 6.4 RFID sensors 6.5 Wireless sensors 6.6 Ratiometric conversion 6.7 Logarithmic compression 6.8 Block diagram of Data acquisition system 6.9 Single channel Data acquisition system. 6.10 Multichannel Data acquisition system	06	14
	Sub total	24	40
	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 (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
1	Transducers	4	4	6	EIG508-1	14
2	Temperature measurement	4	4	6	EIG508-2	14
3	Level Measurement	2	4	6	EIG508-3	12
4	Pressure & Flow measurement	2	4	8	EIG508-4	14
5	Data Transmission & Telemetry	2	4	6	EIG508-5	12
6	Signal conditioning and Data Acquisition System	4	4	6	EIG508-6	14
	Total >>	18	24	38		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

vi) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/ Algorithm/ flowchart	05
	Observation/ Logic/ Program/ Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output Sample Calculations with relevant formulae	05
4	Proper Graphs ,workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma X.*

vii) **Assessment Criteria for Term-end Practical Examination:**

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	Neat & complete circuit Diagram/schematic Diagram /Algorithm/Flowchart/Program	10
2	Procedure followed to achieve the result	10
3	Observation , Result , Output ,simple Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3. PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL :

a) Books / Journals / IS 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 &	Electronic Instruments &	Dorling Kindersly Pvt. Ltd.

	W.D. Cooper	Measurements Techniques	India
4	A. K. Sawaney.	Electrical & Electronics Measurement & Instrumentation	Dhanpat Rai Publications
5	Oliver & cage	Electronic Measurements & Instrumentation	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) www.2l-3com.com/tw/telemetry_tutorial/r_data_acquisition.
- 5) www.nptel.ac.in/courses/108105064/#
- 6) www.engineeringtoolbox.com/flow-meters-d493
- 7) www.instrumaterialiontools.com/category/levelisiesasurement/
- 8) www.web.mst.edu/cotti'ell/ME240/Resoi'ces/Temperature/Temperature.pdf
- 9) www.instrumaterialiontools.com/category/pressure-measurement/
- 10) www.electronics-tutorials.ws/io/io_3.html
- 11) www.isa.org
- 12) NPTEL
- 13) swayam

* * *

COURSE ID:

Course Name : INDUSTRIAL ORGANIZATION AND MANAGEMENT

Course Code : EIG509

Course Abbreviation : GIOM

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	--	
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 :

EIG509.1 Apply principles of management and carry out various functions of management.

EIG509.2 Prepare organization structure for small and medium scale industry.

EIG509.3 Perform duties of stores in-charge, material and finance manager.

EIG509.4 Practice industrial safety rules, codes, practices and acts.

EIG509.5 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 knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PSO 1 Maintain Electrical equipment	PSO 2 Maintain Electrical power systems
Competency: Plan and implement managerial and administrative strategies	-	-	-	-	1	-	1	2	2
EIG509.1 Apply principles of management and carry out various functions of management.	-	-	-	-	1	-	1	1	1
EIG509.2 Prepare organization structure for small and medium scale industry.	-	-	-	-	1	1	-	0	0
EIG509.3 Perform duties of stores in-charge, material and finance manager.	-	-	-	-	-	-	1	2	2
EIG509.4 Practice industrial safety rules, codes, practices and acts.	-	-	-	-	1	-	1	3	3
EIG509.5 Apply various modern management techniques	-	-	-	-	1	-	1	2	2

CONTENT :

A) THEORY :

SECTION -I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>EIG509.1 Apply principles of management and carry out various functions of management.</i>			
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
<i>EIG509.2 Prepare organization structure for small and medium scale industry.</i>			
4	FORMS OF BUSINESS ORGANISATION 4.1 Types 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	04	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	4.7 Public sectors 4.8 Government undertakings		
	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)
<i>EIG509.3 Perform duties of stores in-charge, material and finance manager.</i>			
5	MATERIALS MANAGEMENT 5.1 Importance & Functions Objectives of purchase 5.2 Methods of Purchasing & Procedure Steps of purchasing 5.3 ABC analysis & Economic Order Quantity 5.4 Scope and importance of material management 5.5 Objectives of material management 5.6 Duties of Material manager 5.7 Concept of supply chain management 5.8 Modern trends in material management : MRP,ERP	07	10
6	FINANCE AND ACCOUNTING 6.1 Concept, Scope and Importance & Functions 6.2 Fixed & Working Capital ,Factors affecting Working Capital 6.3 Elements of Cost, Fixed & variable Overheads, Calculation of selling price of product. 6.4 Indirect expenses & Depreciation & Classification of costs. 6.5 Types of Accounts ,Book keeping ,Cost accounting & cost control 6.6 Format of Profit & Loss Account , Balance Sheet 6.7 Labour & Machine hour rate Calculation, Analytical cost estimation of Product 6.8 Sources of Finance 6.9 Industrial taxation	08	12
<i>EIG509.4 Practice industrial safety rules, codes, practices and acts.</i>			
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,	05	10

	Safety codes, Safety training,		
<i>EIG509.5 Apply various modern management techniques.</i>			
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	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	Apply		
1	Principles Of Management	02	04	04	EIG509.1	10
2	Functions Of Management	02	04	06	EIG509.1	12
3	Human Resource management	04	04	02	EIG509.1	10
4	Forms Of Business organization	02	04	02	EIG509.2	08
5	Materials Management	04	02	04	EIG509.3	10
6	Financial Management	02	02	04	EIG509.3	08
7	Industrial Act & Safety	04	04	04	EIG509.4	12
8	Modern Management Techniques	02	02	06	EIG509.5	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>

* * *

COURSE ID :

Course Name : MARKETING MANAGEMENT

Course Code : EIG510

Course Abbreviation : GMRM

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	
Details of 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

RATIONALE:

COMPETENCY:

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:

EIG510-1- To understand marketing, product selling.

EIG510-2- To study market, its types, government policy.

EIG510-3- To understand marketing functions & marketing managers duties.

EIG510-4- To understand how to do marketing of industrial products.

EIG510-5- To understand marketing planning, pricing, buying behavior of customer.

EIG510-6- 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	PSO 1 Operation and Maintenance	PSO 2 Supervision and Providing Solution
Competency: to do best marketing management	-	-	-	-	1	-	1	3	3
EIG510-1	-	-	-	-	1	-	1	2	1
EIG510-2	-	-	-	-	1	-	1	2	1
EIG510-3	-	-	-	-	1	-	1	3	2
EIG510-4	-	-	-	-	1	-	1	3	3
EIG510-5	-	-	-	-	1	-	1	3	3
EIG510-6	-	-	-	-	1	-	1	3	3

CONTENT:

A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG510-1- To understand marketing, product selling.			
01	Marketing Meaning and significance of marketing, marketing system	08	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG510-1- To understand marketing, product selling.			
	1.1 Concept of marketing, product selling. 1.3 Trends in modern Marketing. 1.2 Difference between sales and marketing.		
EIG510-2- 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
EIG510-3- 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)
EIG510-4- 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

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG510-4- To understand how to do marketing of industrial products.			
EIG510-5- 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
EIG510-6- 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	EIG510-1	14
2	Markets	08	04	0	EIG510-2	12
3	Marketing Function & Management	10	04	0	EIG510-3	14
4	Marketing Of Industrial Products	10	05	0	EIG510-4	15
5	Important Concepts	10	05	0	EIG510-5	15
6	Role Of Advertising	6	4	0	EIG510-6	10

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	

COURSE ID:

Course Name : ADVANCE MICROCONTROLLERS
Course Code : EIG512
Course Abbreviation : GADM

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		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks	(i) 25 marks for each practical (ii) One PST of 25 marks	Theory exam (3hours)	Term End Practical Exam (03 hours)	
Marks	20	----	80	50I	150

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

RATIONALE:

This course will present generally advanced microcontrollers systems including assembly language programming and interfacing techniques. Emphasis is on the practical application of microcontrollers as solutions to engineering problems. The course will focus on the PIC microcontroller architecture and peripheral interfacing. 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. The subject will help the students to study concepts of embedded system.

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:

EIG 512-1 Interpret prominent features of different kinds of advance microcontrollers.

EIG 512-2 Interpret the salient architectural features of PIC18f microcontroller

EIG 512-3 Develop and maintain assembly language program for different operations

EIG 512-4 Explore programming skills for I/O ports, Timers/Counters of PIC18F

EIG 512-5 Explore programming skills for Serial ports and CCP/ECCP modes.

EIG 512-6 Interface and program different external devices with PIC18f in assembly

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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Maintain microcontroller based equipments/system.:	1	3	3	1	-	-	-	3	3
EIG 512-1	1	1	2	-	-	-	-	2	2
EIG 512-2	1	3	2	-	-	-	-	2	2
EIG 512-3	-	3	3	1	-	-	-	2	2
EIG 512-4	1	2	3	1	-	-	-	3	3
EIG 512-5	1	2	3	-	-	-	-	3	3
EIG 512-6	1	2	3	-	-	-	-	3	3

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.

CONTENT:

L) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 out of 15 experiments).

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	EIG512-1
2	Addition & subtraction of 8 bit	Understand the concept & use of instructions : MOVLW, ADDWF	EIG512-2-3
3	Addition & Subtraction of 16 bit numbers	Understand the concept & use of instructions : MOVLW, ADDWF, SUBWF, SUBFWB	EIG512-2-3

4	Addition of 2 digit & 4 digit BCD numbers	Understand the concept & use of instructions: DAW	EIG512-2-3
5	Multiplication of 8 bit number	Understand the concept & use of instructions : MOVLW, MULWF	EIG512-2-3
6	Block transfer in forward & reverse direction	Understand the concept of indirect addressing & use of instructions LFSR F, k	EIG512-2-3
7	Block exchange	Understand the concept of indirect addressing & use of instructions LFSR F, k	EIG512-2-3
8	Addition of hexadecimal number in array	Understand the concept of indirect addressing & use of instructions : MOVLW, ADDWF	EIG512-2-3
9	Addition of BCD number in array	Understand the concept of indirect addressing & use of instructions : MOVLW, ADDWF, DAW	EIG512-2-3
10	Find smallest number in array	Understand the concept of indirect addressing & use of instructions : MOVLW, BC, BNC	EIG512-1-2
11	Find an largest number in an array	Understand the concept of indirect addressing & use of instructions : MOVLW, BC, BNC	EIG512-2-3
12	Find positive & negative number in an array	Understand the concept of indirect addressing & use of instructions : BTFSC, BTf	EIG512-2-3
13	Study of ADC interfacing	Understand the concept of Analog to digital conversion	EIG512-4-6
14	Study of SPI interfacing	Understand the concept of SPI bus interfacing	EIG512-4-6
15	Study of RTC DC1306 interfacing.	To learn concept of real time counter interfacing	EIG512-4-6

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work. Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- Build an application of flashing display to flash advertisement
- Build a system to display department name with rolling display
- Build two digit counter system
- Build a class period bell system as per the given time table with 7 teaching periods of 1 hour each
- Build a temperature monitoring system to maintain the given temperature
- Build automated door control system to open and close the door

- g) Build a pollution monitoring system to observe the level of CO₂
- h) Build a traffic light controller for traffic signals as per specified delay
- i) Build a water level controller for given water levels

D)THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>EIG 512-1 Interpret prominent features of different kinds of advance microcontrollers</i>			
1	Introduction to Advance microcontrollers : 1.1 Arduino Platform 1.1.1 Block diagram of Arduino Uno 1.1.2 Architecture (only block diagram) 1.1.3 Introduction to Arduino platform 1.1.4 Overview of main features such as I/O Ports, Timers, interrupts serial port, PWM, ADC, etc. 1.2 MSP430 lunchbox platform 1.2.1 MSP430 microcontroller architecture(only block diagram) 1.2.2 Introduction to launchbox platform 1.2.3 Overview of main features such as I/O Ports, Timers, interrupts serial port, PWM, ADC, etc 1.3 PIC microcontroller : 1.3.1 Introduction to PIC microcontroller 1.3.2 Overview of the PIC18 family 1.3.3 Silent features of the PIC18	06	10
<i>EIG 512-2 Interpret the salient architectural features of PIC18f microcontroller</i>			
2	PIC Architecture : 1.4 RISC Architectural feature of PIC 1.5 Feature of PIC18f 1.6 Pin diagram 1.7 Architecture : Working Register (WREG), status register, Special function registers (SFRs) 1.8 PIC file register 1.9 PIC data format & directives 1.10 Bank Switching in PIC18	08	14
<i>EIG 512-3 Develop and maintain assembly language program for different operations</i>			
3	PIC Instruction & assembly Language Programming: 1.11 Instruction size of PIC18 1.12 Addressing Mode 1.13 Instruction set: Data transfer instruction,	10	16

	Arithmetic instruction logical instruction, Control instruction using branch & Call, Bit oriented instruction, Table processing instruction 1.14 Simple programs		
	Sub-total	24	40

Section II

Sr. No.	Topics	Teaching hours	Marks
<i>EIG 512-4 Explore programming skills for I/O ports, Timers/Counters of PIC18F</i>			
4.	I/O Programming & Timer/counter of PIC: 4.1 I/O port Programming 4.2 I/O bit manipulation Programming 4.3 Timer & Programming : Timer0, Timer1, Timer3 Timer4 4.4 Counter & Programming	08	14
<i>EIG 512-5 Explore programming skills for Serial ports and CCP/ECCP modes.</i>			
5	Serial Port & CCP, ECCP Programming of PIC: 5.1 Interrupt & Programming 5.2 Serial Port Programming 5.3 Stand & enhance CCP module 5.4 Compare mode 5.5 Capture mode 5.6 ECCP mode	08	14
<i>EIG 512-6 Interface and program different external devices with PIC18f in assembly</i>			
6.	External Interfaces: 5.7 ADC Programming 5.8 DAC interfacing and programming 5.9 LCD interfacing and programming 5.10 SPI Interfacing and MSSP module programming 5.11 DS 1306 RTC interfacing and programming	08	12
	Sub total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Introduction to Advance microcontrollers	02	04	04	EIG512-1	10
2	PIC Architecture	02	04	08	EIG512-2	14
3	PIC Instruction & assembly Language Programming	02	04	10	EIG512-3	16
4	I/O Programming & Timer/counter of PIC	02	04	08	EIG512-4	14
5	Serial Port & CCP, ECCP Programming of PIC	02	08	04	EIG512-5	14
6	External Interfaces I	02	04	06	EIG309-6	12
	Total >>	12	28	40		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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

viii) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 IV*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

ix) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments

3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3.PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL:

a) 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
3.	Gaonkar R. S.	PIC Microcontroller	Penram International Publishing (India) Pvt. Ltd.
4	Matic Nebojsa	PIC Microcontroller	Mikroelektronika, 1 st edition 2008
5	John H. Davies	MSP430 microcontroller basics	Newnes Publication
6	Adrian Fernandez	Getting Started with the MSP430 Launchpad	Newness publication
7	Massimo Banzi	Getting Started with Arduino	O'Reilly Media, Inc.

x) Websites

- a. www.nptel.com
- b. www.datasheet.com
- c. www.pic.com
- d. www.microchip.com/pic/
- e. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
- f. <https://www.arduino.cc/en/Guide/ArduinoUno>

* * *

COURSE ID:

Course Name : AUTOMOTIVE ELECTRONICS
Course Code : EIG513
Course Abbreviation : GAEL

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIG309

Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

Evaluation Scheme:

Mode of Evaluation	Progressive Assessment		Term End		Total
	Theory	Practical	Theory	Practical * & Micro-project **	
Details of Evaluation	Average of two tests of 20 marks each to be converted out of 20 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (3 hours)	Term End Practical/ Micro-project Exam (3 hours)	
Marks	20	--	80	50I	150

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

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:

EIG513-1 Appreciate the operation of microcomputer and its architecture

EIG513-2 Discover the characteristic details of various sensors and actuators used in automotive electronics
Appreciate

EIG513-3 Acknowledge the operation of various components of electronic engine management system

EIG513-4 Explore various vehicle management systems used in automobile

EIG513-5 Explore different automotive instrumentation systems used in automobile

EIG513-6 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 and Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design / Development of solutions	PO 4 Engineering Tools, Experimentation and Testing	PO 5 Engineering Practices for society, sustainability and Environment	PO 6 Project Management	PO 7 Life-long Learning	PSO1 Operate and Maintain	PSO2 Supervision and Providing Solution
Competency: Design, implement and maintain 8051 microcontroller based embedded systems	1	2	-	-	-	-	-	-	-
EIG513-1	3	1	-	1	-	-	-	-	-
EIG513-2	3	1	2	2	-	-	-	-	-
EIG513-3	3	2	2	3	-	-	-	-	-
EIG513-4	3	2	3	3	-	1	-	-	2
EIG513-5	3	2	3	3	-	1	-	-	2
EIG513-6	3	2	-	-	-	1	-	-	-

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.

CONTENT:

M) SUGGESTED PRACTICAL'S/ EXERCISE

A.1 Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as practical's and assess the student for attainment of the competency (any 10 out of 15 experiments).

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	<ul style="list-style-type: none"> Locate different components of car. Understand the operation of each. 	EIG513-2,3

2	To know symbols of components connectors, wires.	1. Identify the different symbols used for components. 2. Understand the use of wiring diagram.	EIG513-3,4
3	Interpret the wiring diagram and understand different electrical circuits.	1. Interpretation of wiring diagram. 2. Understand the operation of wiring circuit.	EIG513-3
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.	EIG513-3,4
5	To perform Alternator test	1. Identify the fault. 2. Understand the procedure of testing alternator.	EIG513-4
6	To perform Starter circuit test	1. Identify the fault. 2. Understand the procedure of testing starter circuit.	EIG513-4
7	To test battery	1. Identify the fault. 2. Understand the procedure of testing battery.	EIG513-4, 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	EIG513-2,4,5
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	EIG513-2,4,5
10	To study fuel reserve signal function, cam shaft adjustment function, air injection function.	1. Identify the fault.. 2. Understand the procedure of fuel injection, cam shaft adjustment.	EIG513-3
11	To study Antilock braking system	1. Understand the system 2. Identify the instrumentation and control involving	EIG513-4
12	To study Electronic suspension system	1. Understand the system 2. Identify the instrumentation and control involving	EIG513-4
13	To study Electronic steering control	1. Understand the system 2. Identify the instrumentation and control involving	EIG513-4
14	To study Fuel quantity measurement	1. Understand the system 2. Identify the instrumentation	EIG513-5

		and control involving	
15	To study onboard diagnostic system (OBD)	1. Understand the system 2. Identify the instrumentation and control involving	EIG513-5

A.2 Micro-project

Each student should allotted one microproject in the beginning of the semester. In 3rd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individually undertaken. Each microproject should encompass two or more COs. Each student have to maintain dated work diary consisting of individual contribution in the microproject work.

Micro-project term end assessment carries 20% of maximum marks allotted to term end practical exam.

A suggestive list of microprojects is as follows:

- g) Prepare and display board of electronics sensors/actuators with specifications and relevant applications. The following steps shall be followed:
 - a. Students should visit Shops/Garages for survey
 - b. Collect components and know the specifications
 - c. Study application of components
 - d. Prepare the display board with labeled components specifying their applications
- h) Prepare and display board of various MCUs with specifications and its application in automobile systems. The following steps shall be followed:
 - a. Students should visit Shops/Garages for survey
 - b. See the MCUs and know the specifications
 - c. Study application of each MCU
 - d. Prepare the display board with labeled MCUs specifying their applications
- i) Prepare and display board of various Electronic Vehicle Management Systems (EVMS) like Cruise control system, Antilock braking system, Electronic suspension system, Electronic steering control, Traction control system, Transmission control
 - a. Students should visit Shops/Garages for survey
 - b. See the various Electronic Vehicle Management Systems (EVMS)
 - c. Study application of each EVMS
 - d. Prepare the display board with labeled EVMS specifying their applications
- j) Prepare and display board of various Automotive Instrumentation System like- Fuel quantity measurement, Coolant temperature and oil pressure measurement
- k) Visit garages for demonstration of actual Onboard Diagnostics (OBD) being performed and collect the details

N) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>EIG513-1 Appreciate the operation of microcomputer and its architecture</i>			
1	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.	06	10
<i>EIG513-2 Discover the characteristic details of various sensors and actuators used in automotive electronics</i>			
2	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	08	14
<i>EIG513-3 Acknowledge the operation of various components of electronic engine management system</i>			
3	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	10	16

	3.4.1 Spark advance correction schemes 3.4.2 Fuel injection timing control		
	Sub-total	24	40

Section II

Sr. No.	Topics	Teaching hours	Marks
<i>EIG513-4 Explore various vehicle management systems used in automobile</i>			
4.	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	10	16
<i>EIG513-5 Explore different automotive instrumentation systems used in automobile</i>			
5	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	10	16
<i>EIG513-6 Discover electronic safety systems used in automobile</i>			
6.	Safety 6.1 Airbags 6.2 Collision avoiding system 6.3 Low tyre pressure warning system	04	08
	Sub total	24	40
	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 (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Introduction to microcomputer	8	2	0	EIG513-1	10
2	Sensors and actuators	8	6	0	EIG513-2	14
3	Electronic engine management system	8	4	4	EIG513-3	16
4	Electronic vehicle management system	8	4	4	EIG513-4	16
5	Automotive instrumentation system	8	4	4	EIG513-5	16
6	Safety	4	4	0	EIG513-6	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.

ASSESSMENT CRITERIA FOR PRACTICAL ASSIGNMENTS AND PRACTICAL EXAMINATION

xi) Assessment Criteria for Practical Assignments :

i) Continuous Assessment of Practical Assignments:

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

Domain	Particulars	Marks out of 25
Cognitive	Technical preparedness for practical	05
Psychomotor	Operating skills/Algorithm/flowchart	05
	Observation/Logic/Program/Result	05
Affective	Discipline and punctuality	05
	Procedure/ Safety Measures/ Decency/ Presentation	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 X*.

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	05
2	Procedure followed to achieve the result	05
3	Observations, Result, Output, Sample Calculations with relevant formulae	05
4	Proper Graphs, workmanship and Safety measures	05
5	Oral Based on Test	05
	Total	25

**Final marks of practical assignments shall be awarded as per Assessment Pro-forma IV.*

xii) Assessment Criteria for Term-end Practical Examination:

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	Neat & complete circuit Diagram / schematic Diagram/ Algorithm/ Flowchart/ Program	10
2	Procedure followed to achieve the result	10
3	Observations, Result, Output, Sample Calculations with relevant formulae	10
4	Proper Graphs, workmanship and Safety measures	10
5	Oral	10
	Total	50

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Online/Offline Lectures cum Discussions
2. Regular home assignments
3. Laboratory work

Teaching and Learning Resources:

1. Chalk board 2. Video clips 3.PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL:

a) 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	4 th edition- Routledge – 2012
3	Barry Hollembeak	Automotive Electricity and Electronics	Delmar Cengage Learning; 5 th edition, 2011
4	William B Ribbens	Understanding Automotive Electronics: An Engineering Perspective	Newne Butterworth-Heinemann, 7 th edition 2012
5	Kripal Singh Vol I	Automobile Engineering	Standerd Publishers, New Delhi
6	Kripal Singh Vol II	Automobile Engineering	Standerd Publishers, New Delhi

b) Websites

- i. <https://www.electronicdesign.com/markets/automotive>
- ii. <https://www.mentor.com/embedded-software/automotive/>
- iii. <https://www.avnet.com/wps/portal/apac/resources/article/automotive-electronics-top-5-tech-trends-tomorrows-smart-cars/>
- iv. Search for 'Automotive Electronics' on <https://www.youtube.com/>, <https://www.google.com/>
- v. <https://www.lacroix-electronics.com/market-sectors/automotive/>
- vi. Search 'Automotive Electronics' on <https://ieeexplore.ieee.org/>

(ANNEXURE)

BRIDGE COURSE FOR DSY STUDENTS

COURSE ID : EIG
Course Name : Basics of Electronic Components and Devices
Course Abbreviation : BECD

TEACHING AND EVALUATION SCHEME:

Prerequisites : NIL

Teaching Scheme:

Scheme Component	Hrs per Week	Hours
Theory	02	12*2=24

Evaluation Scheme:- Assignments/Practical Demonstrations on each chapter should be given and assessed. Following are the sample practical exercise which can be demonstrated to the student. Teacher can design their own assignments/practical exercise if required.

Sr No.	Title of Practical Exercise
1.	Identify types of resistors and find values of given resistor by color coding method
2.	Identify types of inductor and find values of given inductor by color coding method
3.	Identify types of capacitor and find values of given capacitor
4.	Identify different types of cables, connector, switches
5.	Test the performance of PN junction diode
6.	Test the performance of zener diode
7.	Test Zener voltage regulator for given voltage
8.	Test the half wave circuits on breadboard
9.	Test the full wave center-tapped circuit on breadboard
10	Test the full wave bridge circuit on breadboard
11	Test the full wave bridge circuit on breadboard with π -filter
12	Test the working of the BJT as an amplifier in CE mode
13	Test the performance of Regulator IC's: IC's 78XX, 79XX.

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.

COMPETENCY :

Maintain electronic circuits comprising of discrete electronics components

Cognitive : Illustrate the operation of basic electronics components and devices.

Psychomotor : Troubleshoot simple basic electronics circuit.

Affective : Attitude of i) Identify ii) Draw iii) Operate v)Test

Course Outcomes

CO 1 – Identify and use different Passive Electronic Components.

CO 2 - Illustrate the use of Cables, Connectors and Switches in different applications.

CO 3 – Illustrate the use of PCB in different equipment.

CO-4 Identify and use semiconductor diodes as per requirement

CO-5 Illustrate the use of rectifiers ,filters and voltage regulator in electronics circuit

CO-6 Use transistor biasing circuits and amplifiers as per requirement

CONTENTS:

A) THEORY:

SECTION-I

Sr. No.	Topics	Teaching hours
	<i>CO 1 – Identify and use different Passive Electronic Components.</i>	
1	1. Passive Electronic Components 1.1. Resistors 1.1.1. Resistor Classification 1.1.2. Resistor Specifications 1.1.3. Fixed Resistors : Examples with diagrams, symbols and applications 1.1.4. Variable Resistors : Examples with diagrams, symbols and applications 1.1.5. Colour Coding of Resistors 1.2. Capacitors 1.2.1. Capacitor Classification 1.2.2. Capacitor Specifications 1.2.3. Fixed Capacitors : Examples with diagrams, symbols and applications 1.2.4. Variable Capacitors : Examples with diagrams, symbols and applications 1.2.5. Capacitor Coding 1.3. Inductors 1.3.1. Inductor Classification 1.3.2. Inductor Specifications 1.3.3. Fixed Inductors : Examples with diagrams, symbols and applications	03

	1.3.4. Variable Inductors : Examples with diagrams, symbols and applications	
	<i>CO 2 - Illustrate the use of Cables, Connectors and Switches in different applications.</i>	
2	2. Cables, Connectors and Switches 2.1. Cables 2.1.1. Specifications of cables: characteristic impedance, current carrying capacity, flexibility. 2.1.2. Types of cables: Construction, and applications of coaxial cable, telephone cable, FRC cable, Twin core cable (Twisted & Shielded type) cable used for CRO, optical Fiber Cable. 2.2. Connectors 2.2.1. Specifications of connectors: contact resistance, breakdown voltage, insulation resistance 2.2.2. Types of Connectors: Construction and applications of BNC, TNC, RF, D series, Audio, Video, printer, edge, FRC connectors, Phone Plug & Jacks 2.3. Switches 2.3.1. Specifications of Switches: voltage rating, contact current rating, contact resistance, life- electrical life, mechanical life 2.3.2. Types of Switches: Construction and application of Toggle, Rotary, push to on & push to off, Rocker switch, slide switch.	04
	<i>CO 3 – Illustrate the use of PCB in different equipment.</i>	
3	3. Introduction to PCB 3.1. Concept of PCB ,Advantages & disadvantages of PCB, Types of PCB 3.2. Base & Conducting material, types of laminates, Flowchart for preparation of single sided PCB	02
	<i>CO-4 Identify and use semiconductor diodes as per requirement</i>	
4	Semiconductor Devices: Overview of Semiconductors – symbol, construction ,basic principle, operation, and characteristics and applications of PN-junction diode, Zener diode, BJT, JFET MOSFET	07

	CO-5 Illustrate the use of rectifiers ,filters and voltage regulator in electronics circuit	
5	Regulated Power Supply: Block diagram of regulated power supply Rectifiers : Classification of rectifier Half wave rectifier and full wave rectifier (Center-tapped and bridge):Circuit diagram and working Filters Need of filter and types of filter Operation of each filter w.r.t. full wave bridge Rectifier only Voltage Regulator: Zener diode as a voltage regulator-Circuit diagram and working Types of IC voltage regulator-Fixed and Variable voltage regulator IC 78xx & IC 79xx series of voltage regulators and IC 723 voltage regulator: Features, Pin diagram, Applications	05
	CO-6 Use transistor biasing circuits and amplifiers as per requirement	
6	Bipolar Junction Transistor Biasing Switching action of transistor Load line- DC Load Line and Q Point Bias Stability, stability factor, Factors affecting bias stability, Thermal runaway Transistor Biasing Methods-List only Types of amplifiers: Single stage and multistage Amplifiers -Circuit diagram and function of each component	03

REFERENCE MATERIAL:

a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	Harper Charles A	Handbook of components for Electronics	Laxmi Enterprise, Bombay
2.	Thomas H. Jones	Electronic component Handbook	Reston publishing company
3	S. M. Dhir	Electronic Materials & component	Tata McGraw-Hill Education Pvt. Ltd; New Delhi
4	Walter C. Bosshart	Printed Circuit Boards	Tata McGraw-Hill Education Pvt. Ltd; New Delhi
5	V. K. Mehta	Principles of Electronics	S.Chand
6	R.S.Sedha	A text book of Applied Electronics	S.Chand
7	Malvino	Electronics Principles	McGraw Hill

b) Websites:

1. <http://www.electronica-india.com/>
2. <http://electronicsclub.info/>
3. <http://nptel.ac.in>
4. <http://www.electronics-tutorials.com/>
5. <http://www.efymag.com/>
6. <http://www.electronicsforu.com>
7. <http://www.kpsec.freeuk.com/symbol.htm>
8. http://en.wikipedia.org/wiki/Electronic_component

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