GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

Curriculum Document

CURRICULUM: MPECS 2020

(Outcome Based Curriculum)
For

DIPLOMA IN ELECTRONICS & TELECOMMUNICATION

Secretary **Chairman**

Programme wise Board of Studies (PBOS)
Electronics & Telecommunication Programme
Government Polytechnic, Kolhapur

INDEX

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

Curriculum philosophy:

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

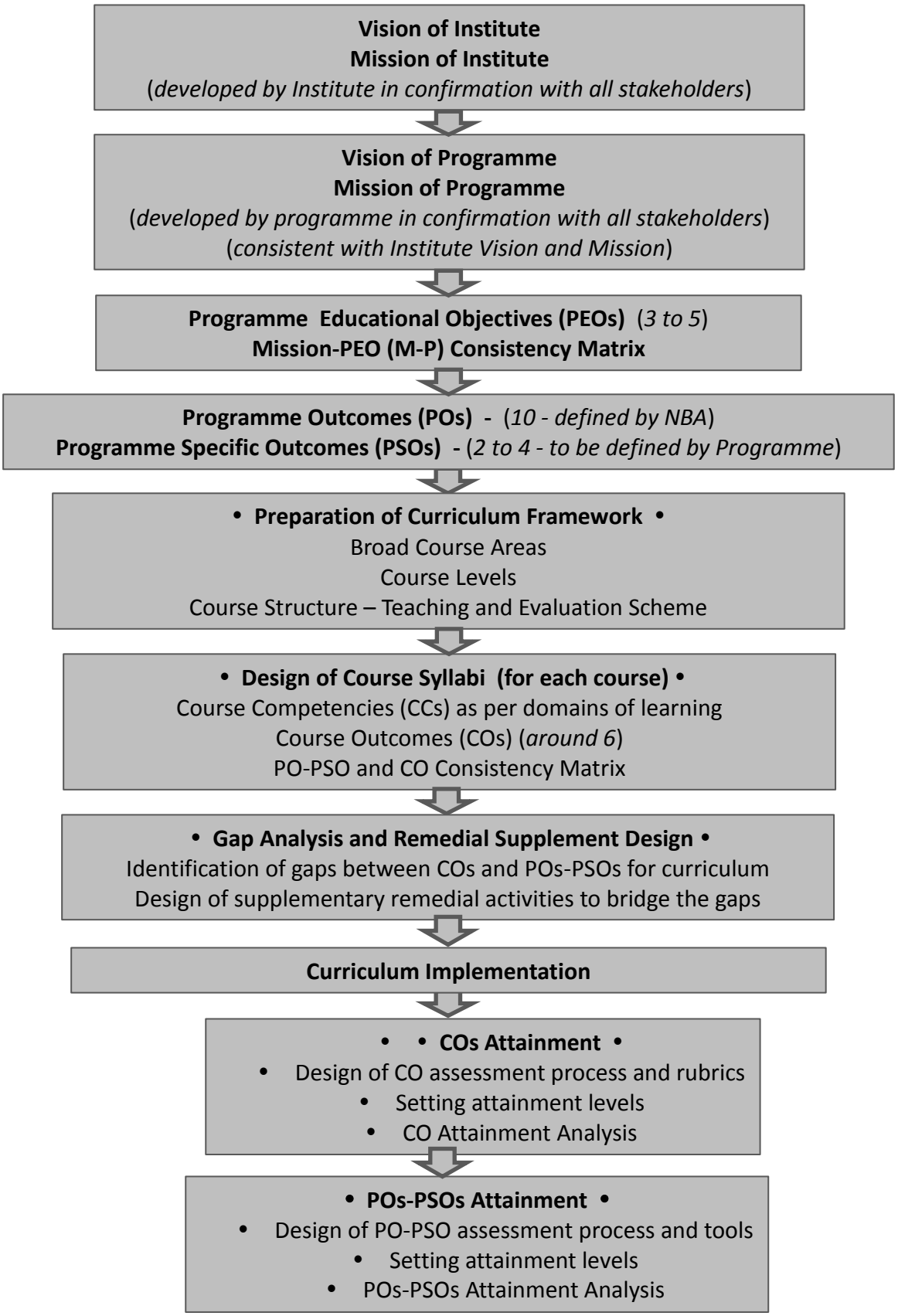
- To accept systematic planning methods
- To confirm implementation strategies
- To identify and to incorporate needs of industries
- To follow the policy directives
- To cope-up with social concerns
- To aim at personality development of students
- To allow future developments and challenges in emerging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

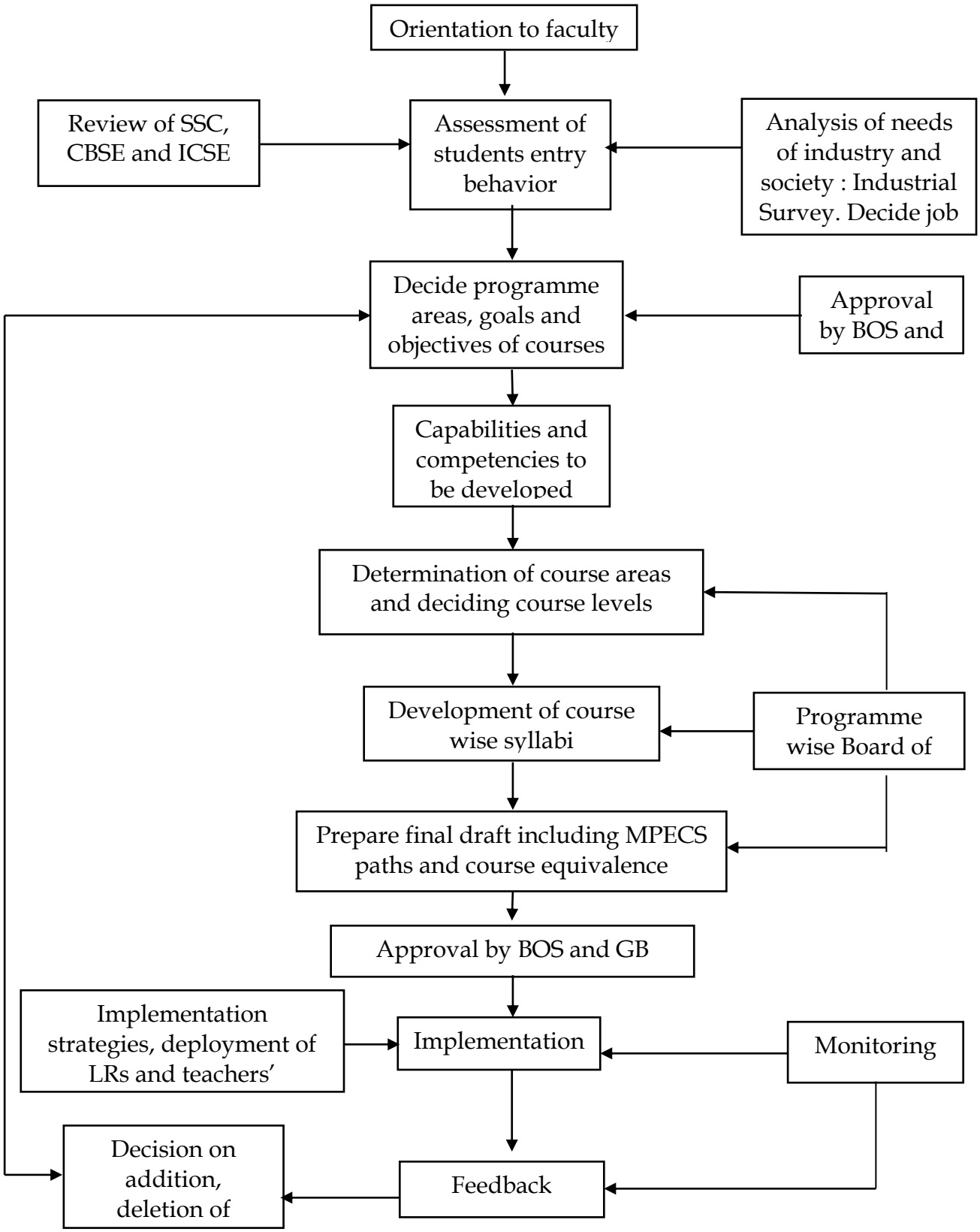
Programme Dean – He/she is the Head of Department of a Programme Department

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
  Government Polytechnic, Kolhapur is the first Government Polytechnic in Maharashtra to have been awarded academic autonomy
- Year of award of MPECS and Flexibility : 1994
- 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:

Institute of high recognition to develop 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 Electronics and Telecommunication .

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 Electronics & Telecommunication

Programme Educational Objectives (PEOs):

Diploma graduates will,

PEO 1: Apply fundamental knowledge of Basic Sciences, Mathematics and Electronics and Telecommunication engineering in problem solving.

PEO 2: Operate, demonstrate and debug the systems in the field of Electronics and Telecommunication engineering and to resolve real life problems.

PEO 3: Attain technical knowledge, skills and attitude to acquire further advancement in technology for lifelong learning.

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

Programme Outcomes (POs)

1. **Basic 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 Electronics & Telecommunication engineering 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 and Telecommunication engineering industry.

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	**28**
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	**05**
	Credits	**09**
	Marks	**150**
Courses in Level III	Number	**11**
	Credits	**61**
	Marks	**1575**
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	**52:48** (60:40 to 50:50)
	Marks-wise	**60:40**
No. of Allied Courses		**05**
Elective Courses	No. of Elective courses	**04**
	Options per Elective Course	**02/03**
Number of Practical Exams	External	**12**
	Internal	**22**

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 discussions with the industry persons 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 Development (4 Credits)
9. Consumer Electronics (Elective) (5 Credits)
10. Instrumentation (Elective) (5 Credits)
11. Introduction to IOT (Elective) (5 Credits)
12. Basics of Power Electronics

- **Following courses are deleted:**

1. Generic Skills (4 Credits)
2. Professional Practices (3 Credits)
3. Computer fundamentals and Applications (3 Credits)
4. Higher Maths (Elective) (4 Credits)
5. Non-conventional Energy Resources (Elective) (4 Credits)
6. VLSI (Elective) (6 Credits)
7. Audio and Video Engg (Elective) (5 Credits)

- **Major modifications in Course Contents with justification:**

1. To adapt OBE for the courses 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. Theory credits of following courses are reduce from 4 to 3
    a. Mobile Communication

b. Power Electronics
c. Data Communication & Networking
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

6. Practical credits of Engineering Graphics course are reduced from 4 to 2.
7. Practical credits of the following courses increased from 2 to 4.
    a. Applied Electronics
    b. Linear Integrated Circuits
    c. Microcontrollers
    d. C Programming
8. Micro projects are added in the programme core courses from 3rd semester onward.

- **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

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

Sr. No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme		
									Theory		Practical
						TH	PR / DRG / Tutorial	Credits	ESE	PA	ESE / PR
	Level 1: Foundation Courses										
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 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	-
	Level I Courses Sub-Total:					**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	-	-	-
	Level II Courses Sub-Total:					**11**	**4**	**9**	**40**	**10**	**100**
	Level 3: Basic Technology Courses										
16	Applied Mathematics	EIG301	GAMT	3	CCG118	3	1	4	80	20	-
17	Applied Electronics	EIG302	GATX	3	EIG103	3	4	7	80	20	75E
18	Electronic Measuring Instruments	EIG303	GEMI	3	--	3	2	5	80	20	50I
19	C Programming	EIG304	GCPR	3	--	2	4	6	-	-	100E
20	Analog Communication	EIG305	GACM	3	--	3	2	5	80	20	50I
21	Digital techniques & application	ETG306	GDTA		--	3	2	5	80	20	50E
22	Linear Integrated Circuits	EIG307	GLIC	3	--	3	4	7	80	20	75E
23	Circuits & Networks	EIG308	GCKN	3	--	3	2	5	80	20	50I
24	Microcontrollers	EIG309	GMCS	3	EIG306	3	4	7	80	20	75E

25	Digital Communication	ETG310	GDCM	3		3	2	5	80	20	50I
26	Basics of Power Electronics	ETG311	GPTX	3	--	3	2	5	40	10	50I
	Level III Courses Sub-Total:					**32**	**29**	**61**	**760**	**190**	**825**
	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	Data Communication & Networking	ETG405	GDCN	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
	Level IV Courses Sub-Total:					**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	Optical Fiber Communication	ETG504	GOFC	5	--	3	2	5	80	20	50I
38	Mobile & Wireless Communication	ETG505	GMCM	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
	Level V Courses Sub-Total:					**17**	**14**	**36**	**400**	**100**	**375**
	Grand Total:					**94**	**81**	**180**	**2160**	**540**	**1800**
	Credits in %:					**52**	**48**	**100**	**48**	**12**	**40**

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
	Elective 1										
1	Signals and Systems	ETG407	GSAS	4	--	3	2	5	80	20	50I
2	Satellite Communication	ETG408	GSAT	4	--	3	2	5	80	20	50I
	Elective 2										
4	Consumer Electronics	EIG507	GENC	5	--	3	2	5	80	20	25I
5	Instrumentation	EIG508	GINS	5	--	3	2	5	80	20	25I
6	Introduction to IOT	ETG514	GIOT	5	--	3	2	5	80	20	25I
	Elective 3										
6	Industrial Organization Management	EIG509	GIOM	5	--	3	-	3	80	20	-
7	Marketing Management	EIG510	GMRM	5	--	3	-	3	80	20	-
	Elective 4										
8	Programmable Logic Controllers	ETG511	GPLC	5	--	3	2	5	80	20	50I
9	Advance Microcontrollers	EIG512	GADM	5	--	3	2	5	80	20	50I
10	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

Sr. No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme		
									Theory		Practical
						TH	PR / DRG / Tutorial	Credits	ESE	PA	ESE / PR
	Semester I										
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
	Semester I Total:					**14**	**11**	**25**	**240**	**60**	**275**
	Semester II										
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	-	-	-
	Semester II Total:					**18**	**11**	**27**	**360**	**90**	**200**
	Semester III										
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	ETG306	GDTA	3	--	3	2	5	80	20	50E
	Semester III Total:					**17**	**15**	**32**	**400**	**100**	**325**

	Semester IV										
20	Essence of Indian Traditional Knowledge	CCG205	GIKT	2	--	2	0	0	-	-	-
21	Linear Integrated Circuits	EIG307	GLIC	3	--	3	4	7	80	20	75E
22	Circuits & Networks	EIG308	GCKN	3	--	3	2	5	80	20	50I
23	Microcontrollers	EIG309	GMCS	3	EIG306	3	4	7	80	20	75E
24	Digital Communication	ETG310	GDCM	3	--	3	2	5	80	20	50I
25	Basics of Power Electronics	ETG311	GPTX	3	--	3	2	5	40	10	50I
26	Simulation Software	EIG401	GSIM	4	--	0	4	4	-	-	50I
	Semester IV Total:					**17**	**18**	**33**	**360**	**90**	**350**
	Semester V										
27	Indian Constitution	CCG206	GINC	2	--	2	0	0	-	-	-
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	Internship – 1 (4 weeks after 4th Semester)	CCG502	GINO	5	--	0	0	3	-	-	50E
32	Data Communication & Networking	ETG405	GDCN	5	--	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
	Semester V Total:					**17**	**12**	**30**	**400**	**100**	**325**
	Semester VI										
35	Optical Fiber Communication	ETG504	GOFC	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 Semester)	CCG503	GINT	5	--	0	0	2	-	-	50E
39	Mobile & Wireless Communication	ETG505	GMCM	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
	Semester VI Total:					**17**	**14**	**33**	**400**	**100**	**325**

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

Sr. No.	Name of Course	Course Code	Course Abbreviation	Level	Pre-requisite Course	Teaching Scheme (hours per week)			Examination Scheme		
									Theory		Practical
						TH	PR / DRG / Tutorial	Credits	ESE	PA	ESE / PR
	Semester III										
1	Applied Mathematics	EIG301	GAMT	3	--	3	1	4	80	20	-
2	Applied Electronics	EIG302	GATX	3	--	3	4	7	80	20	75E
3	Electronic Measuring Instruments	EIG303	GEMI	3	--	3	2	5	80	20	50I
4	C Programming	EIG304	GCPR	3	--	2	4	6	-	-	100E
5	Analog Communication	EIG305	GACM	3	--	3	2	5	80	20	50I
6	Digital techniques & application	ETG306	GDTA	3	--	3	2	5	80	20	50E
	Semester III Total:					**17**	**15**	**32**	**400**	**100**	**325**
	Semester IV										
7	Essence of Indian Traditional Knowledge	CCG205	GIKT	2	--	2	0	0	-	-	-
8	Linear Integrated Circuits	EIG307	GLIC	3	--	3	4	7	80	20	75E
9	Circuit & Network	EIG308	GCKN	3	--	3	2	5	80	20	50I
10	Microcontrollers	EIG309	GMCS	3	EIG306	3	4	7	80	20	75E
11	Digital Communication	ETG310	GDCM	3	--	3	2	5	80	20	50I
12	Basics of Power Electronics	ETG311	GPTX	3	--	3	2	5	40	10	50I
13	Simulation Software	EIG401	GSIM	4	--	0	4	4	-	-	50I
	Semester IV Total:					**17**	**18**	**33**	**360**	**90**	**350**
	Semester V										
14	Indian Constitution	CCG206	GINC	2	--	2	0	0	-	-	-
15	Embedded Systems	EIG402	GEMS	4	EIG309	3	2	5	80	20	50E
16	Electronics Circuit Design	EIG403	GECD	4	--	3	2	5	80	20	50E
17	Project I	EIG404	GPR1	4	--	0	2	2	-	-	50I
18	Internship – 1 (4 weeks after 4th Semester)	CCG502	GINO	5	--	0	0	3	-	-	50E
19	Data Communication & Networking	ETG405	GDCN	5	--	3	2	5	80	20	50I
20	Elective– 1			4	--	3	2	5	80	20	50I
21	Elective– 2			5	--	3	2	5	80	20	25I
	Semester V Total:					**17**	**12**	**30**	**400**	**100**	**325**

	Semester VI										
22	Optical Fiber Communication	ETG504	GOFC	4	--	3	2	5	80	20	50I
23	Principles of Control Systems	EIG406	GPCS	4	--	3	2	5	80	20	25I
24	Entrepreneurship Development	CCG501	GESU	5	--	2	2	4	-	-	50E
25	Internship – 2 (3 weeks after 5th Semester)	CCG503	GINT	5	--	0	0	2	-	-	50E
26	Mobile & Wireless Communication	ETG505	GMCM	5	--	3	2	5	80	20	25I
27	Project-II	EIG506	GPR2	5	EIG404	0	4	4	-	-	75E
28	Elective– 3			5	--	3	0	3	80	20	-
29	Elective– 4			5	--	3	2	5	80	20	50I
	Semester VI Total:					**17**	**14**	**33**	**400**	**100**	**325**

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

6. EXEMPTIONS FOR COURSES

Eligibility for Exemptions for First and Second Semester Courses of MPECS-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 MCVC	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	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-2009	MPECS-2010	MPECS-2013	MPECS-2016	MPECS-2020
1	**R101**-Generic Skill	**X101**-Generic Skill	**CCE201**-Gen. Skills	**CCF201**-Gen. Skills	**--**
2	**ET103**- Basic Physics	**X102**-Basic Physics	**CCE102**-Engineering Physics	**CCF102**-Engineering Physics	**CCG102**-Engineering Physics
3	**ET104**-Basic Chemistry	**X103**-Applied Chemistry	**CCE104**-Engineering Chemistry	**CCF104**-Chemistry of Engineering materials	**CCG104**-Engineering Chemistry
4	**R107**-Basic Mathematics	**X104**-Basic Mathematics	**CCE105**-Basic Mathematics	**CCF105**-Basic Mathematics	**CCG105**-Basic Mathematics
5	ET109-Engg. Drawing	IX/EJ 105-Engineering Drawing	-----	-----	--
6	**R102**-Comm.Skills	**X106**-Comm.Skills	**CCE202**-Com.Skills	**CCF202**-Com.Skills	**CCG203**-Communication Skills
7	**ET113**-Workshop Practice	**IX/EJ107**-Basic workshop practice	**CCF114**-Workshop Practice	**CCF114**-Workshop Practice	**CCG114**-Workshop Practice
8	**ET105**-Engg. Science	**X108** -Engg. Science	---	---	---
9	**ET106**-Electronic Components and application	**IX/EJ 109**-Electronic Components and Applications	**IEE/ETE103**-Electronic Components and Applications	**EIF 101**-Electronics Components &Application	**EIG101**-Electronics Components &Application
10	**R108**-Engg Mathematics	**X110**-Engineering Mathematics	**CCE106**-Engineering Mathematics	**CCF 106**-Engineering Mathematics	**CCG118**-Engineering Mathematics
11	**ET111**-Computer Fundamental & Application	----	**IEE/ETE108**-Computer Fundamental & Application	**EIF 108**-Computer Fundamental & Application	**CCG201**-Introduction to IT System
12	**ET112**-Basic Electronics	**IX/EJ111** Basic Electronics	**IEE/ETE103**-Basic Electronics	**EIF 103**-Basic Electronics	**EIG103**-Basic Electronics
13	-----	-----	**EIF107**- Basic Electrical Engg	**EIF 107**- Basic Electrical Engg	**EIG107**- Basic Electrical Engg
14	-----	-----	**CCE 109**-Engineering Graphics	**CCF 109**-Engineering Graphics	**CCG109**-Engineering Graphics
15	-----	**IX/EJ112** Circuit & Network	**IEE/ETE308** Circuit &	**EIF 308**- Circuit & Network	**EIG308**- Circuit & Network

			Network		
16	----	----	**CCE203-** Professional Practices	**CCF203-** Professional Practices	**----**
17	----	----	**CCE204-** Environmental Studies	**--**	**CCG204-** Environmental Science
18	**ET114-** Elecronics Manufacturing Graphics & Workshop	---	---	---	----
19	**ET201-** Applied Mathematics	**ET201-** Applied Mathematics	**IEE/ETE301-** Applied Mathematics	**EIF 301-** Applied Mathematics	**EIG301-** Applied Mathematics
20	**ET202-** Applied Electronics	**ET202-** Applied Electronics	**IEE/ETE302-** Applied Electronics	**EIF 302-** Applied Electronics	**EIG302-** Applied Electronics
21	**ET203-** Personality Development	----	----	----	----
22	**ET204-** Electronics Measuring Instruments	**IX/EJ203-** Electronics Measuring Instruments	**IEE/ETE303-** Electronics Measuring Instruments	**EIF 303-** Electronics Measuring Instruments	**EIG303-** Electronics Measuring Instruments
23	**ET110-**C Programming	**IX/EJ204** C Programming	**IEE/ETE304**- C Programming	**EIF 304**-C Programming	**EIG304**-C Programming
24	**ET205-** Electrical Engineering	---	---	----	----
25	**ET206-** Analog Communication	**IX/EJ205-** Analog Communication	**IEE/ETE305-** Analog Communication	**EIF 305**-Analog Communication	**EIG305**-Analog Communication
26	**ET207-** Linear Integrated Circuits	**IX/EJ206-** Linear Integrated Circuits	**IEE/ETE307-** Linear Integrated Circuits	**EIF 307-** Linear Integrated Circuits	**EIG307-** Linear Integrated Circuits
27	**ET208-** Digital Techniques	**IX/EJ207-** Digital Techniques	**IEE/ETE306-** Digital Techniques & Application	**EIF 306-**Digital Techniques &Application	**EIG306-**Digital Techniques &Application
28	**ET209-** Digital Communication	**IX/EJ208-** Digital Communication	**ETE310-**Digital Communication	**ETF310-**Digital Communication	**ETG310-**Digital Communication
29	**ET210-** Microprocessor & Interfacing	**IX/EJ209-** Microprocessor & Interfacing	**IEE/ETE309-** Microprocessor & Interfacing	----	----
30	**ET211-** Project & Seminar-I	---	**IEE/ETE503**- Project-1	**EIF 503**- Project-1	**EIF404**-Project-1
31	**R222-** Electrical	---	---	---	---

	CKTS. & M\Cs				
32	**R223-** Basic Electronics	---	---	---	---
33	**R227-** Non Conventional Energy Sources	---	**IEE/ETE311-** Non Conventional Energy Sources	**EIF 311-**Non Conventional Energy Sources	---
34	**R228-** Higher Maths	**IX/EJ210**-Higher Engineering Maths	**IEE/ETE312**-Higher Mathematics	**EIF 312**- Higher Mathematics	---
35	**ET302-** Industrial Electronics	**IX/EJ211**-Industrial Electronics	**IEE/ETE401-** Power Electronics-1	**EIF 401-**Power Electronics-1	**--**
36	**ET301**-Advance Communication System	**EJ301**-Advance Communication System	---	---	---
37	**ET303-**8051 Microcontroller	**EJ302-**8051 Microcontroller	**IEE/ETE402-** 8051 Microcontroller	**EIF 309-**8051 Microcontroller	**EIG309-** Microcontrollers
38	**ET304-** Control System	**EJ303-**Feedback Control System	**IEE/ETE404-** Principles of Control System	**EIF 404-** Principles Of control System	**EIG406-** Principles Of control System
39	**ET306-** Instrumentation	**EJ304-** Instrumentation	---	---	---
40	**ET308-** Optoelectronics	**EJ 305-** Optoelectronics	---	---	---
41	**ET309-** Medical Electronics	**EJ306-**Medical Electronics	---	---	---
42	**ET310-** Optical Fiber Communication	**EJ307-**Optical Fiber Communication	**ETE502-**Optical Fiber Communication	**ETF502-**Optical Fiber Communication	**ETG504-** Optical Fiber Communication
43	**ET311-** Electronics Circuit Design	**EJ308-** Electronics Circuit Design	**IEE/ETE406-** Electronics Circuit Design	**EIF 406-** Electronics Circuit Design	**EIG403-** Electronics Circuit Design
44	**ET312-** Signals & Systems	**EJ309-** Signals & Systems	**ETE507-** Signals & Systems	**ETF 407-** Signals & Systems	**ETG407-** Signals & Systems
45	**ET401-** Mobile Communication	**EJ401-** Mobile Communication	**ETE501-** Mobile Communication	**ETF501-** Mobile Communication	**ETG505-** Mobile and Wireless Communication
46	**ET402-** PC Hardware & Maintenance	**----**	**----**	----	**----**
47	**ET403-** Introduction To Matlab & OrCAD	**EJ402-** Introduction To Matlab & OrCAD	**IEE/ETE405-** Simulation Software	**EIF 405-** Simulation Software	**EIG401-** Simulation Software
48	**ET305-** Project & Seminar-II	**EJ403-**Project	**IEE/ETE504-** Project II	**EIF 504-**Project II	**EIG506-**Project II

49	**ET404-** Industrial Organization & Management	**EJ404-** Industrial Organization & Management	**IEE/ETE508-** Industrial Organization & Management	**CCF 501 -** Industrial Organization & Management	**EIG509 -** Industrial Organization & Management
50	**ET405-** Marketing Management	**EJ405-** Marketing Management	**IEE/ETE509-** Marketing Management	**EIF 509-** Marketing Management	----
51	**ET406-** Project Management	-----	----	----	----
52	**ET307-** Entrepreneurship Development	**EJ406-** Entrepreneurship Development	**IEE/ETE510-** Entrepreneurship Development	**EIF 510-** Entrepreneurship Development	**CCG501-** Entrepreneurship Development
53	**ET407-** VLSI Design	**EJ407-** VLSI Design	**IEE/ETE 407-** VLSI	**EIF 513**-VLSI	----
54	**ET408-** Embedded System	**EJ408-** Embedded System	---	**EIF 402-** Embedded Systems	**EIG402-** Embedded Systems
55	**ET412-** Data Communication & Networks	**EJ409-** Data Communication & Networks	**ETE403**-Data Communication & Networks	**ETF403**-Data Communication & Networks	**ETG405**-Data Communication & Networks
56	**ET410-** Audio Video Engineering	**EJ410-**Audio Video Engineering	**ETE 506-**Audio Video Engineering	**ETF506-**Audio Video Engineering	**EIG507** Consumer Electronics
57	**ET411-** Microwave Engineering	**EJ411-** Microwave Engineering	----	----	----
58	**ET409-** Introduction TO DSP	**EJ412-** DSP	**ETE513-** Fundamental of DSP	----	----
59	**ET413-** Mobile Phone Servicing	**EJ413-** Mobile Phone Servicing	---	---	----
60	**ET414-** Computer Networking	**EJ414-** Computer Networking	----	----	----
61	**ET415-** Visual Basic & MS ACCESS	**EJ415-**VB & MS ACCESS	----	----	----
62	----	----	**ETE505-**Radar & Navigation	**ETF505-**Radar & Navigation	----
63	----	----	**ETE408-**Satellite Communication	**ETF408-** Satellite Communication	**ETG408-** Satellite Communication
64	----	----	**ETE 511-**PLC & Drives	**ETF511-**PLC & Drives	**ETG511-**PLC
65	----	----	**ETE 512**-PIC Microcontroller	**EIF 512-**PIC Microcontroller	**ETG512-** Advance Microcontrollers
66	----	----	----	**EIF 507**-Energy	----

				Conservation	
67	----	----	----	----	**EIG510**- Accounting
68	----	----	----	----	**EIG513**- Automotive Electronics
69	----	----	----	----	**CCG117**- Sports and Yoga
70	----	----	----	----	**CCG205**- Essence of Indian Traditional Knowledge
71	----	----	----	----	**CCG206**-Indian Constitution
72	----	----	----	----	**CCG502**- Internship – 1 (4 weeks after 4th Semester)
73	----	----	----	----	**CCG503**- Internship – 2 (3 weeks after 5th Semester)
74	-----	-----	ETE511 PLC and Drives	ETF511 PLC and Drives	**ETG511** Programmable Logic Controllers
75	----	----	----	IEF403 Instrumentation	**EIG508**- Instrumentation
75	----	----	----	----	**ETG311**- Basics of Power Electronics
75	----	----	----	----	**ETG514**- Introduction to Internet of Things

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:-_____

Sr. No.	Roll No./ Exam. Seat No.	Marks of Progressive Skill Test	Marks of Continuous Assessment	Performance of Term End PR/OR by Internal Examiner	Performance of Term End PR/OR by External Examiner	Marks Out of (Total of Col.2 to 5)	Marks As per Evaluation Scheme(as mention in Exam. Scheme)
	Column No-1	2	3	4	5	6	7
	Max.Marks	25	25	25	25	100	

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:-_____

Sr. No.	Roll No./ Exam. Seat No.	Marks of Progressive Skill Test	Marks of Continuous Assessment	Performance of Term End PR/OR by Internal Examiner	Marks out of (Total of Col.2 to 4)	Marks As per Evaluation Scheme (as mention in exam. Scheme)
	Column No-1	2	3	4	5	6
	Max.Marks	25	25	50	100	

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:-_____

Sr. No.	Roll No./ Exam. Seat No.	Marks of Progressive Skill Test	Marks of Continuous Assessment	Marks As per Evaluation Scheme for micro-project (to be assessed by internal examiner)	Performance of Term End PR/OR by Internal Examiner	Performance of Term End PR/OR by External Examiner	Marks Out of (Total of col.2 to 6)	Marks As per Evaluation Scheme (as mention in Exam.Scheme)
	Column	2	3	4	5	6	7	8
	Max.Marks Allotted	25	25	25	25	25	125	

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:-_____

Sr. No.	Roll No./ Exam. Seat No.	Marks of Progressive Skill Test	Marks of Continuous Assessment	Marks As per Evaluation Scheme for micro-project (to be assessed by internal examiner)	Performance Of Term End PR/OR by Internal Examiner	Marks out of (Total of col.2 to 5)	Marks As per Evaluation Scheme(as mention in Exam. Scheme)
	Column	2	3	4	5	6	7
	Max.Marks Allotted	25	25	25	50	125	

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	-	-	-	3	2
EIG101-1 Identify and use various types of resistors in different applications.	3	-	2	-	-	-	-	-	2
EIG101-2 Identify and use various types of capacitors in different applications.	3	-	2		-	-	-	-	2
EIG101-3 Identify and use various types of inductors in different applications.	3	-	2		-	-	-	-	2
EIG101-4 Illustrate the use of cables and connectors in different applications**.**	3	-	2		-	-	-	-	2
EIG101-5 Illustrate the use of switches ,relays and displays in industrial applications.	3	-	2		-	-	-	-	2
EIG101-6 Illustrate the use of PCB,ICs and SMDs in electronic equipment.	3	-	2	-	-	-	-	3	-

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

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 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 generator. 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 methods.	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 the use of different types of cables.	EIG101-4

10.	Identification of different types of connectors.	1) Identify different the use of different connectors	EIG101-4
11.	Test performance of Switches	1) Identify different types of switches, 2) Test the working of switches.	EIG101-5
12.	Test performance of relay	1) Identify different types of Relays 2) Test the working of relay	EIG101-5
13.	Test performance of Displays	1)Identify different types of Displays. 2)Test the working of the displays.	EIG101-5
14.	Identification of SMDs and ICs	1)Identify SMDs and ICs.	EIG 101-6
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	**12**	**14**

	Potentiometer 1.8 Color Coding with three, four and five bands and Equivalent circuit of resistors		
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 voltage, Insulation resistance, c/v ratio, power factor, Capacitive Reactance 2.3 Construction, application of Fixed Capacitor - Disc Ceramic capacitor, Aluminum electrolytic capacitor, Tantalum electrolytic capacitor 2.4 Construction, working, applications of Variable capacitor,-Air Gang, PVC gang capacitor, Trimmer capacitor 2.5 Coding of capacitors using numerals and color band system and Equivalent circuit of capacitors	**12**	**14**
EIG101-3 *Identify and use various types of inductors in different applications.*			
03	**Inductors:** 3.1 Concept of Inductor, Classification of Inductor 3.2 Specifications:-self inductance ,mutual inductance, coefficient of coupling, Q factor, Inductive Reactance 3.3 Construction, application of Fixed Inductor- Air core, iron core and ferrite core 3.4 Frequency range Inductors - (A.F.,R.F.,I.F.),filter choke and toroidal Inductor 3.5 Construction, working, application of variable Inductor-Slug tuned Inductor, Tapped Inductor. 3.6 Colors coding of Inductor and Equivalent circuit of Inductor.	**8**	**12**
	Sub-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	**Cables and Connectors** **Cables:** 4.1 Types of cable, specifications of cables- characteristic impedance, current carrying capacity, flexibility. 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. **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	10	14
EIG101-5 *Illustrate the use of switches ,relays and displays in industrial applications.*			
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 5.7Construction, operation & applications of Liquid crystal display (LCD)-Dynamic	14	16

	Scattering Display 5.8 Difference between switch, relay and Displays.		
EIG101-6 *Illustrate the use of PCB,ICs and SMDs in electronic equipment.*			
06	**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 **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	08	10
	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./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 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 II.*

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.*

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 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.	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	Khanna

		Component	
9.	Debashis De	Basic Electronics	Pearson
10.	Charles A. Harper	Handbook of components for Electronics	Laxmi Enterprise
11	Grover & Jamwal	Electronic Components and Materials	Dhanpat Rai & Sons
12	M.L. Gupta	Electrical Engineering Materials	Dhanpat Rai & Sons
13	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
Competency: *Apply principles of Physics to solve engineering problems.*	2	1	-	1	1	1	1	-	-
CCG101-1 Estimate errors in measurement of physical quantities.	2	1	-	1	1	1	1	-	-
CCG101-2 Select proper material in engineering industry by analysis of its physical properties	2	1	-	1	1	1	1	-	-
CCG101-3 Use basic principles of wave motion for related engineering applications	1	1	-	1	1	1	1	-	-
CCG101-4 Apply principles of optics, electricity to solve engineering problems	2	1	-	1	1	1	1	-	-
CCG101-5 Express the importance of Lasers, X-rays and nanotechnology.	1	-	-	-	1	-	1	-	-
CCG102-6 Apply principles of fiber optics for related engineering applications	1	-	-	-	-	-	1	-	-

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering in theoperation and maintenance of engineering application systems.
PSO 2: Supervision and providing solution: Ability to supervise work and reach appropriatesolution to simple practical problems in Electronics & Telecommunication engineering engineering industry.

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 vi) Interpreting results	CCG102-1
*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	i) Going through safety measures required ii) Drawing the circuit diagram of the required experiment. iii) Connecting the instruments as per circuit diagram.	CCG102-4

	Ammeter – Voltmeter method.	iv) Measuring the value of potential difference & current in the circuit. v) Tabulating observations and calculations vi) Interpreting results	
*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 nL = 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.	CCG102-4

		iv)Tabulating observations and calculations v) Interpreting results	
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		

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 **SimpleNumerical 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 **SimpleNumerical problems**	06	10

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
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
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**SimpleNumerical problems**	**06**	**08**
6	**ELECTRICITY** 6.1 Concept of electric current , resistance 6.2 Ohm's law, Specific resistance	**06**	**10**

	6.3 Resistances in series and parallel. 6.4 Wheatstone's Network and Meter Bridge. 6.5 **SimpleNumerical problems**		
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 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**	**08** (03) (03) (02)	**14** (06) (04) (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	FiberOptics	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

a) 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

b) Criteria for assessment at semester end practical exam :
Every student has to perform one practical within 2 hours at semester end practical exam which shall be assessed as per following criteria.

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods :

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

Teaching and Learning resources:

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

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

1) http://www.physicsclassroom.com
2) http://scienceworld.wolfram.com/physics/
3) http://physics.about.com/
4) http://nptel.ac.in/course.php?disciplineId=115
5) http://nptel.ac.in/course.php?disciplineId=104
6) www.fearofphysics.com
7) www.science.howstuffworks.com

* * *

COURSE ID:

Course Name: **BASIC ELECTRONICS**

Course Code: **EIG103**

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 equipment. 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 devices and 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: Describe the operation, characteristics and use of semiconductor diodes.
EIG103-2: Test rectifier and filter circuits in electronics-based system.
EIG103-3: Illustrate the operation, characteristics & use of bipolar junction transistor and its configuration.
EIG103-4: Examine and use various types of biasing circuits and amplifiers.
EIG103-5: Illustrate the operation, characteristics, use of FET.
EIG103-6: Demonstrate 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	-	-	3	2	2
EIG103-1 Identify and handle semiconductor diodes.	2	-	-	-	-	-	2	2	2
EIG103-2 Examine and operate rectifier and filter.	3	-	-	2	-	-	3	2	2
EIG103-3 Identify and use various types bipolar junction transistor and its configuration	3	-	-	2	-	-	2	-	-
EIG103-4 Examine and use various of types of biasing circuits and amplifiers	3	-	-	2	-	-	3	-	-
EIG103-5 Identify and use types of FET	3	-	-	1	-	-	2	-	-
EIG103-6 Illustrate the use of different regulated power supplies	3	-	-	2	-	-	3	3	3

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

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.	V-I characteristics of PN junction diode.	1. Build and test the circuit as per experimental set-up 2. Plot V-I characteristics.	EIG 103-1
2.	V-I characteristics of zener diode.	1. Build and test the circuit as per experimental set-up 2. Plot V-I characteristics.	EIG 103-1
3.	Zener diode as voltage regulator	1. Build and test the circuit as per experimental set-up 2. Plot graph of input parameters vs output parameters.	EIG 103-6
4.	Half wave rectifier	1. Build and test the circuit as per experimental set-up 2. Plot the input and output waveforms on graph.	EIG 103-2
5.	Full wave center-tapped rectifier	1. Build and test the circuit as per experimental set-up 2. Plot the input and output waveforms on graph.	EIG 103-2
6.	Full wave bridge rectifier	1. Build and test the circuit as per experimental set-up 2. Plot the input and output waveforms on graph.	EIG 103-2
7.	Shunt C filter with any one type of rectifier	1. Build and test the circuit as per experimental set-up 2. Plot the input and output waveforms on graph	EIG 103-2
8.	LC filter with any one type of rectifier	1. Build and test the circuit as per experimental set-up 2. Plot the input and output waveforms on graph	EIG 103-2
9.	Full wave bridge circuit with π-filter	1. Build and test the circuit as per experimental set-up 2. Plot the input and output waveforms on graph	EIG 103-2
10.	Input and Output characteristics of BJT in common base configuration.	1. Build and test the circuit as per experimental set-up 2. Plot graph of input parameters vs	EIG 103-3

		output parameters	
11.	Input and Output characteristics of BJT in common emitter configuration.	1. Build and test the circuit as per experimental set-up 2. Plot graph of input parameters vs output parameters	EIG 103-3
12.	Identification of transistor specification using datasheet.	1. Identify various specifications given in datasheet 2. Note the values in observation table	EIG 103-3
13.	Voltage divider biasing circuit.	1. Test the circuit as per circuit diagram 2. Record the reading in observation table.	EIG 103-4
14.	BJT as a single stage CE amplifier.	1. Build and test the circuit as per experimental set-up 2. Sketch the graph of input & output waveforms.	EIG 103-4
15.	Drain characteristics of FET	1. Build and test the circuit as per experimental set-up 2. Sketch the graph drain characteristics	EIG103-5
16.	Transfer characteristics of FET	1. Build and test the circuit as per experimental set-up 2. Sketch the graph transfer characteristics	EIG103-5
17.	Fixed voltage regulator IC's: IC's 78XX, 79XX.	1. Build and test the circuit as per experimental set-up	EIG103-6
18.	Low or high voltage regulator using IC723.	1. Build and test the circuit as per experimental set-up 2. Verify the output.	EIG103-6
19.	Test various blocks of DC regulated power supply.	1. Test the output at various points.	EIG103-6

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIG103-1 Describe the operation, characteristics and use of semiconductor diodes.		
1	**1. Semiconductor Diode** 1.1. Conductor , Insulator, semiconductor 1.1.1. Band theory 1.1.2. Intrinsic semiconductor : Si , Ge 1.1.3. Doping 1.1.4. Extrinsic semiconductor : P type, N type 1.2. P.N. junction diode – Ge & Si 1.2.1. Constructional features 1.2.2. Operating principle 1.2.3. Characteristics 1.2.4. Applications 1.2.5. Specifications 1.3. Zener diode	**10**	**14**

	1.3.1. Constructional features 1.3.2. Operating principles 1.3.3. Breakdown in diodes-Avalanche, zener 1.3.4. Characteristics 1.3.5. Specifications 1.3.6. Applications		
	EIG103-2 Test rectifier and filter circuits in electronics-based system.		
2.	**2. Rectifiers and Filters** 2.1. Rectifiers: 2.1.1. Definition: Rectification, rectifier 2.1.2. Need of rectification 2.1.3. Classification of rectifier 2.2. Half wave rectifier and full wave rectifier (Center-tapped and bridge) 2.2.1. Circuit diagram and waveforms 2.2.2. Operation 2.2.3. Parameters its definition and values for corresponding rectifier- 2.2.3.1. Average output voltage and current 2.2.3.2. Ripple factor 2.2.3.3. Rectifier efficiency 2.2.3.4. Peak Inverse Voltage 2.2.3.5. Transformer Utilization Factor 2.2.4. Comparison of rectifier 2.3. Filter – 2.3.1. Need of filter 2.3.2. Types of filter- 2.3.2.1. Shunt capacitor filter 2.3.2.2. Series inductor filter 2.3.2.3. LC filter 2.3.2.4. CLC filter 2.3.3. Operation of each filter w.r.t. full wave bridge rectifier only 2.3.4. Comparison of filters	**10**	**12**
	EIG103-3 Illustrate the operation, characteristics & use of bipolar junction transistor and its configuration.		
3	**3. Bipolar Junction Transistor(BJT)** 3.1. BJT-.Types, symbols 3.2. Construction of BJT. 3.3. Operating principles of NPN & PNP Transistor 3.4. Transistor configurations & Modes of operation 3.5. Transistor input & output characteristic of CE & CB configuration. 3.6. 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($V_{CE(sat)}$) 3.7. Relation between α & β	**12**	**14**

	3.8. Switching action of transistor 3.9. Applications of transistor 3.10. Numerical based on relation of I_C,I_E & I_B.		
	Sub-total	**32**	**40**

SECTION II

Sr. No.	Topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIG103-4 Examine and use various types of biasing circuits and amplifiers.		
4.	**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 4.4. Transistor Biasing Methods-List and Circuit ,Equations, advantages & disadvantages Of 4.4.1. Fixed Bias Circuit 4.4.2. Voltage Divider Bias Circuit 4.5. Types of amplifiers: Single stage and multistage Amplifiers 4.6. Single stage CE amplifier. 4.6.1. Circuit Diagram 4.6.2. Working (Function of each component) 4.6.3. Input Output Waveform 4.6.4. Frequency response and bandwidth 4.6.5. Applications 4.7. Types of coupling in multistage amplifiers 4.8. Two-stage RC Coupled CE amplifier 4.8.1. Circuit Diagram 4.8.2. Working(Function of each component) 4.8.3. Applications	**12**	**14**
	EIG103-5 Illustrate the operation, characteristics, use of FET.		
5	5. **Field Effect Transistor (FET)** 5.1. FET as voltage controlled device, Classification of FET 5.2. Junction Field Effect Transistor(JFET) 5.2.1. Symbols of N-channel and P-channel JFET 5.2.2. Construction of N-channel and P-channel JFET 5.2.3. Working principle of N-channel JFET 5.2.4. Drain and transfer Characteristics of N-channel JFET 5.2.5. JFET parameters-A.C. drain resistance(rd), trans-conductance (gm),amplification factor(μ) 5.2.6. Relation between μ,rd & gm	**12**	**14**

	5.2.7. Advantages, disadvantages, applications of JFET 5.3. Comparison between JFET and BJT 5.4. Metal Oxide Field Effect Transistor:- 5.4.1. Types of MOSFET- Depletion type MOSFET and Enhancement type MOSFET 5.4.2. Symbol of Depletion type MOSFET and Enhancement type MOSFET, 5.4.3. Working principle of N-channel depletion and enhancement type MOSFET 5.4.4. Applications of MOSFET		
EIG103-6 Demonstrate the use of different regulated power supplies.			
6.	**6. Regulated Power Supply** 6.1. Block diagram of Regulated power supply. 6.2. Load and Line Regulation 6.3. Zener diode as a voltage regulator-Circuit diagram and working 6.4. Types of IC voltage regulator-Fixed and Variable voltage regulator 6.5. IC 78xx & IC 79xx series of voltage regulators 6.5.1. Features 6.5.2. Pin diagram 6.5.3. Applications 6.5.4. Practical example with IC such as 7805,12 6.6. 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**	**30**	**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

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	Preparation for practical	05
Psychomotor	Operating skills	05
	Observation/Result	05
Affective	Discipline and punctuality	05
	Procedure/Safety 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*

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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	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.
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*	150

* Assessment as per proforma II.

RATIONALE:

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

COMPETENCY:

Apply principles of advanced chemistry to solve engineering problems.

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

i) Sketching and labeling the diagrams for extraction of copper
ii) Experimentally analyze the water samples for preparing portable water by different methods.
iii) Preparing a chart showing the percentage, composition, properties and industrial applications of soldiers.
iv) Handling and using glassware chemicals.

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

COURSE OUTCOMES

1. **CCG104-1** Apply the basic knowledge of engineering chemistry in industrial applications.
2. **CCG104-2** Interpret the reasons for industrial corrosion and its remedies by using protective techniques.
3. **CCG104-3** Select the relevant catalyst, alloys, insulators, adhesives, composite materials, plastic and rubber for different applications in the field of engineering.
4. **CCG104-4** Use of water for Domestic and Industrial purposes and its relevant treatment to solve industrial problems.
5. **CCG104-5** Illustrate the method of extraction of copper.
6. **CCG104-6** Select the proper type of alloys and 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	1.5	1.36	-	3.0	2.0	0.64	3.0	1	-
CCG104-1	1.5	3	-	1.5	3.0	0.64	3.0	1	-
CCG104-2	1.5	2	-	1.0	1.5	0.64	3.0	-	-
CCG104-3	1.5	0.0	-	-	1.5	0.64	3.0	-	-
CCG104-4	1.5	2.5	-	1.5	3.0	0.64	3.0	-	-
CCG104-5	1.5	0.4	-	-	1.5	0.64	3.0	-	-
CCG104-6	1.5	0.6	-	-	1.5	0.64	3.0	-	-

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

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	Recognize chemicals, glassware & instruments used in a chemistry laboratory	CCG104-1
2	Volumetric analysis of the solution.	Define molecular weight, equivalent weight, acidity, basicity, and normality of solution. Awareness of different types of titrations, use of indicators	CCG104-1
3	Preparation of 1 N, 0.5 N & 0.1 N Solutions of different chemicals like NaOH, HCI, Oxalic acid, $FeSO_4$, etc.	Develop skills in weighing, handling Glassware & measuring solutions	CCG104-1
4	Titration of strong acid and strong bases (HCl X NaOH)	Determine accurate end point of titration & develop practical skills.	CCG104-1
5	Titration of strong acid, strong base& weak acid (HCI X NaOH X $H_2C_2O_4.H_2O$	Determine accurate end point of titration & develop practical skills.	CCG104-1
6	Titration of a weak base, strong acid & strong base (Na_2CO_3 X H_2SO_4 X KOH	Determine the accurate end point of titration & develop practical skills.	CCG104-1
7	Estimation of chloride content in water by Mohr's method	Develop skills in utilization of practical data for testing & estimation.	CCG104-4
8	Determination of the amount of Ca and Mg ions present in a given sample of water by the E.D.T.A method	Develop skills in utilization of practical data for testing & estimation.	CCG104-4
9	Estimation of viscosity of oils by Ostwald's method	Determine the coefficient of viscosity of given solutions.	CCG104-1
10	Estimation of Ca in limestone.	Calculate the percentage of Ca in the limestone.	CCG104-4
11	Titration of $KMnO_4$ & $FeSO_4$ (Redox titration)	Estimate the percentage of Fe in the alloys.	CCG104-6
12	Estimation of % of Fe in a given sample of steel	Estimate the percentage of Fe in the alloys.	CCG104-6
13	Determination of alkalinity of water	Measure alkalinity of the given sample of water.	CCG104-4

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCG104-1 Apply the basic knowledge of engineering chemistry in industrial applications.			
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_2O, CO_2	**05**	**08**
CCG104-1 Apply the basic knowledge of engineering chemistry in industrial applications.			
2	**ELECTROCHEMISTRY** 2.1 Definitions- Conductor, Electrolyte, Electrode, Ionization, Electrolysis. 2.2 Arrhenius Theory of Ionization 2.3 Degree of Ionization & Factors affecting the degree of ionization. 2.4 Electrolysis of molten NaCl. 2.5 Electrolysis of CuSO4 solution by using Cu-electrodes 2.6 Industrial applications of electrolysis 2.6.1 Electroplating 2.6.2 Electro refining of Cu	**05**	**08**
CCG104-2 Interpret the reasons of industrial corrosion and its remedies by using protective 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 Definition. 4.2 Types of Catalysts with example. - Homogenous catalyst. - Heterogeneous catalyst 4.3 Promotors. 4.4 Negative catalysis. 4.5 Autocatalysis.	**02**	**04**
CCG104-3 Select the relevant catalyst, alloys, insulators, adhesive, composite materials, plastic and rubber for different applications in the field of engineering.			
5	**CHEMISTRY OF NONMETALLIC ENGINEERING MATERIALS** ***5.1*** **INSULATORS** 5.1.1 Definition & Characteristics of insulator 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 polymerizations – 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 5.4.2 Drawbacks of Natural rubber.	**08**	**14**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	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)
CCG104-4 Use of water for Domestic and Industrial purposes and its relevant treatment to solve industrial 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, chloramine with chemical reactions 6.7 Ion Exchange method to remove total hardness of Water.	**08**	**12**
CCG104-1 Apply the basic knowledge of engineering chemistry in industrial applications.			

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**
CCG104-5 Illustrate 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**
CCG104-6 Select the proper type of alloys, and 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	CCG104-1	08
I / 3	Corrosion & protective coating	02	02	02	CCG104-2	06
I/4	Catalysis	02	02	-	CCG104-3	04
I/5	Chemistry of nonmetallic engineering materials	04	06	04	CCG104-3	14
II//6	Water	04	04	04	CCG104-4	12
II/7	Cell & Batteries	04	04	02	CCG104-1	10
II/8	Metallic conductors	06	06	02	CCG104-5	14
II/9	Solders	02	02	-	CCG104-6	04
	Total	**32**	**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.

Criteria for Continuous Assessment of Practical work

a) Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments :

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

Domain	Particulars	Marks out of 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 Timeliness and accuracy	05
TOTAL		**25**

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

b) Criteria for assessment at semester end practical exam:
Every student has to perform one practical within 2 hours at semester end practical exam which shall be assessed as per following criteria.

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

INSTRUCTIONAL STRATEGIES:

Instructional Methods:

1. Lectures cum 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

1) www.substech.com
2) www.kentchemistry.com
3) www.chemcollective.org
4) www.wqa.org
5) www.chemistry teaching.com

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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:

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: To solve given problems based on laws of logarithm	3	2	1	2	-	-	3		
CCG105-2 : To solve simultaneous equations using Cramer's rule.	3	2	1	2	-	-	3		
CCG105-3 : To resolve a given function into partial fractions.	3	2	2	2	-	-	3		
CCG105-4 : To learn algebra of matrices & hence find Adjoint & Inverse of a given matrix	3	2	2	2	-	-	3		
CCG105-5 : To memorize and solve problems using trigonometric formulae.	3	2	2	3	-	1	3		

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

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** 2.1Definition of nth order determinant 2.2Expansion 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**
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.*			

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 2θ, 3θ 7.2 Examples	**05**	**10**
8	**Factorization and Defactorization Formulae** 8.1 Proofs of above formulae 8.2 Examples	**04**	**08**
9	**Inverse Trigonometric Ratios** 9.1 Definition 9.2 Principle value 9.3 Proof of standard formulae 9.4 Examples	**07**	**10**
	Total	**24**	**40**
1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only. **2**.In each topic corresponding applications will be explained			

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

Topic No.	Name of topic	Distribution of marks (level wise)			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.	G.V. Kumbhojkar	A Text Book on Engineering Mathematics (First Year Diploma)	Phadake Prakashan, Kolhapur
2.	B.S. Grewal	Higher Engineering Mathematics	Khanna Publication,New Dhelhi
3.	H.K.Das	Higher Engineering Mathematics	S.Chand Publication,New Dhelhi
4.	Patel, Rawal and others	Basic Mathematics	Nirali Prakashan,Pune
5.	P.M.Patil and Others	Basic Mathematics	Vision Prakashan, Pune
6.	S. S. Shastry	Engineering Mathematics	Prentice Hall of India
7.	Sameer Shaha	Basic Mathematics	Tech Max Publication

b) Website

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

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COURSE ID:

Course Name : BASIC ELECTRICAL ENGINEERING (IE/ET)

Course Code : EIG107

Course Abbreviation : GBEE

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 Examination**		**Total**
	Theory	Practical	Theory Examination	Practical Examination (Internal)	
Details of Evaluation	--	. 25 marks for each practical . One PST of 25 marks	--	--	
Marks	20	--	80	50I	**150**

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

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: Attitude

i) Safety
ii) curiosity, interest and self-confidence
iii) 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.

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

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

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2
EIG107-1	3	0	0	0	0	0	0	1	1
EIG107-2	3	1	0	0	0	0	0	2	1
EIG107-3	3	3	3	0	0	0	0	1	1
EIG107-4	3	1	2	0	0	0	0	1	2
EIG107-5	2	3	2	0	1	0	0	1	1
EIG107-6	2	2	2	0	1	0	0	2	1

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

CONTENTS:

A. LABORATORY WORK:

Laboratory experiments and related skills to be developed:

Sr. No.	Title of Experiment	Skills 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)	. Identify different components in electrical laboratory . Use voltmeter and ammeter.	1
2.	To measure the voltages across resistances in the circuit and verify the readings using Kirchhoff's Voltage Law.	. Implement Kirchhoff's voltage law to solve electrical circuits.	1
3.	To measure the currents across resistances in the circuit and verify the readings using Kirchhoff's Current Law.	. Implement Kirchhoff's current law to solve electrical circuits.	1
4.	Determine the permeability of magnetic material by plotting its B-H curve.	. Measure magnetic flux density and electric field intensity. . Plot B-H curve of a material.	2
5.	Observe and identify the direction induced emf in the coil with the moving magnet and moving coil. (Verify Faraday's law of electromagnetic induction and Lenz law)	. Identify direction of induced emf in given environment.	3
6.	Connect resistances in series and parallel connection and measure its resistances by using Ohm's law. Verify if by multi-meter.	. Connect electrical loads in series and parallel.	1 & 4
7.	Use rheostat as a current regulator.	. Use variable resistance as current regulator.	1 & 4
8	Use rheostat as a potential divider.	. Use variable resistance as current regulator	1 & 4

9	Calculate R, L and power factor of series RL circuit by measuring voltages and currents in circuit.	Identify AC meters. Measure AC quantities.	5
10	Calculate R, C and power factor of series RC circuit by measuring voltages and currents in circuit.	. Identify AC meters. . Measure AC quantities.	5
11	Calculate R, L, C and power factor of series RLC circuit by measuring voltages and currents in circuit.	. Identify AC meters. . Measure AC quantities.	5
12	To study construction of single phase low voltage transformers.	Identify various parts of the transformer.	6

B. THEORY:

Sr. No	Topics / Sub-topics	Lectures (Hours)
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
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.	8
	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 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.	6
	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) 9. Multiplication and division of sinusoidal alternating quantities. (Simple Numerical)	10

	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 Circuit with resistance and inductance in series (Concept of power factor) Circuit with resistance and capacitance in series (Concept of power factor) Circuit with resistance inductance and capacitance in series (Concept of power factor) 4. Active and reactive power in single phase series circuit.	8
	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 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 stunt and series DC motors. 7.Basic principle of earthing, necessity of earthing, types of earthing (pipe earthing and plate earthing)	6

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 & equipment handling skill	02
5	Safety and precautions procedure in lab	04
6	Oral Based on Lab work	04
7	Completion of task	04
	TOTAL	25

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:

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.

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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) 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 entrepreneurial 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	-

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

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

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CCG109-1Understand various fundamentals in engineering drawing		
1	**Introduction To Engineering Drawing** 1.1 Drawing Instruments and their uses 1.2 Standard sizes of drawing sheets 1.3 Letters and numbers (single stroke vertical) 1.4 Convention of lines and their applications 1.5 Dimensioning technique as per SP-46 (Latest Edition) 1.6 Types and applications of chain, parallel and Co-ordinate dimensioning	**06**	**10**
	CCG109-2Produce the projection of point, lines& planes inclined to one reference plane		
2	**Projection Of Point And Lines** 2.1 Projection of points when point is in first quadrant Only 2.2 Projection of Line inclined to one Reference plane and Parallel to other Reference Plane (Both ends of line should be in first quadrant)	**06**	**06**
	CCG109-2Produce the projection of point, lines& planes inclined to one reference plane.		
3	**Projection Of Planes** 3.1 Projection of Planes of Circular , Square, Triangular, Rectangular Shapes Inclined to One Reference Plane and perpendicular to other Reference Plane. (Planes in First Quadrant Only)	**04**	**06**

SECTION II

	CCG109-3Produce orthographic drawing from given pictorial view.		
4	**Orthographic Projection** 4.1 Introduction of Orthographic Projection-First and Third angle Projection Method 4.2 Conversion of Pictorial view into Orthographic Views. (First angle Projection Method Only) 4.3 Dimensioning Technique as per SP-46 (Simple objects only)	**06**	**08**
	CCG109-4 Produce sectional orthographic drawing from given pictorial view.		
5	**Sectional Views.** 5.1 Types of sections	**04**	**08**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.2 Conversion of pictorial view into sectional Orthographic views. (First Angle Projection Method only) (Simple objects only)		
	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 Examination			Total
	Theory	Practical	Theory Examination	Practical	Oral Examination	
Details of Evaluation	Average of two tests of 20 marks Each	i) 25 marks for each practical ii) One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma III	-	
Marks	Nil	--	-	50I	--	**50**

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

RATIONALE:

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

COMPETENCY:

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

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

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

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

COURSE OUTCOMES:

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								
	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**	**PSO 1 Operate & Maintain,**	**PSO 2 Supervision & Providing Solutions**
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

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

CONTENT:

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

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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 Exam 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 elated 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		
CCG117-1 Practice Physical activities and Yoga for strength, flexibility, and relaxation.	2	2	2	-	-	-	-		
CCG117-2 Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.	3	2	3	-	2	-	2		
CCG117- 3 Learn breathing exercises and healthy fitness activities	2	2	3	-	2	2	1		
CCG117-4 Understand basic skills associated with yoga and physical activities including strength and flexibility, balance & coordination.	2	2	2	-	2	-	2		
CCG117-5 Perform yoga movements in various combination and forms.	2	2	2	-	-	-	-		
CCG117-6 Assess current personal fitness levels.	2	2	3	-	2	-	-		
CCG117-7 Identify opportunities for participation in yoga and sports activities.	3	2	3	-	2	2	2		
CCG117-8 Develop understanding of health-related fitness components: cardio respiratory endurance, flexibility and body composition etc.	2	2	2	-	-	-	-		
CCG117-9 Improve personal fitness through participation in sports and yogic activities.	3	2	3	-	2	-	2		
CCG117-10 Develop understanding of psychological problems associated with the age and lifestyle.	2	2	3	-	2	2	1		
CCG117-11 Demonstrate an understanding of sound nutritional practices as related to health and physical performance.	2	2	2	-	2	-	2		
CCG117-12 Assess yoga activities in terms of fitness value.	2	2	2	-	-	-	-		
CCG117-13 Identify and apply injury prevention principles related to yoga and physical fitness activities.	2	2	3	-	2	-	-		
CCG117-14 Understand and correctly apply biomechanical and physiological principles elated to exercise and training.	2	2	2	-	-	-	-		

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

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 o Preventing Health Threats through Lifestyle Change o Concept of Positive Lifestyle
3	**Introduction to Ashtang Yog** o Meaning & Importance Yam, Niyam, Aasan, Pranayam, Pratyahar, Dharana, Dhyan & Samadhi
4	**Postures** 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** 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** o Meaning & Importance of Pranayam o Breathing Exercises : Slow & Fast, Kapalbhati 1.Nadishodhan (Anulom- Vilom) 2.Sheetali 3.Sitkari 4.Ujjayi 5.Bhramari 6.Bhastrika

7	**Yoga & Lifestyle** 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 Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.
8	**Sun Salutation (Suryanamaskar)** o Meaning and concept of Suryanamaskar o Postures o Use of breathing techniques and Mantras
9.	**Yogasan** o Meaning and Importance of Yogasan o Types of Yogasan : Naukasan, Dhanurasan, Garudasan, Virasan, Sarvangasan, Matsyasan, Parighasan, Ushtrasan, Hansasan & Mayurasan
10	**Prayer** o Meaning and Importance of Prayer o Omkar Chanting o Meditation & Mudras
11.	**Psychology & Sports** 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. 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 EXAMIATION

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(COs):

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 : To understand and solve examples of complex numbers.	3	2	2	2	1	-	3		
CCG118-2 : To solve problems on two dimensional co-ordinate geometry for straight line	3	2	2	2	1	-	3		
CCG118-3 : To find approximate solution of algebraic equations and simultaneous equations by various methods.	3	2	2	2	3	-	3		
CCG118-4 : To find limits of different types of functions using various methods.	3	2	2	2	1	-	3		
CCG118-5 : To solve the problems of maxima, minima and geometrical applications.	3	2	2	2	3	-	3		

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

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- movier's theorem
2	Straight line	Examples on different forms of straight line.
3		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)
	Course outcome CCG106-1 : *To understand and solve examples of complex numbers.*		
1	**Complex Number** 1.1Definition ,Algebra of complex numbers, simple examples 1.2 Polar form, Exponential form 1.3 De- Moivre's theorem	**06**	**10**
	Course outcome CCG106-2 : *To solve problems on two dimensional co-ordinate geometry for straight line.*		
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**
	Course outcome CCG106-3 : *To find approximate solution of algebraic equations and simultaneous equations by various methods.*		
3	**Numerical solution of Algebraic Equations** 4.1 Bisection Method 4.2 Regula- Falsi Method	**06**	**10**
4	**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)
	Course outcome CCG106-4: *To find limits of different types of functions using various methods.*		
5	**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**
6	**Limits** 7.1 Definition 7.2 Limits of algebraic functions by factorization, simplification, rationalization ,Limit as $x \rightarrow \infty$	**05**	**08**
	Course outcome CCG106-5: *To solve the problems of maxima, minima and geometrical applications.*		
7	**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**
8	**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 Engineering Mathematics	Khanna Publication,New Dhelhi
3	H.K.Das	Higher Engineering 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:

1) www.khanacademy.org
2) www.easycalculation.com
3) 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**

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

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 → / CO ↓	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 Lifelong Learning	PSO1 Design and development	PSO2 Database and Network management
COMPENTENCY-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**

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

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.	. 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	. 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	Table: . Insert, format Table. . Sort data in table Mail-Merge: 1. Create main document and data source 2. Merge the main document and data source. 3. Merge to file and merge to print.	CCG201-3
7.	Creating and Editing a Spreadsheet	. 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.	. 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	1. Use of custom animation effect 2. Use of action buttons on slides 3. Rehearse time-setting of slide show	CCG201-3
10	Internet Basics	. 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.)	. Register for e-mail ID. . Communicate with others using e-mail	CCG201-4

		. Installation, use of Anti-virus software,	
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 Input Devices-Keyboards, mouse, joystick, pen , scanners, (Introduction to latest types) Output Devices-Monitors, Projectors, Speakers, Printers (Introduction to latest types) **1.5 Secondary Storage Devices:-** CD/DVD , USB/ Flash Dives, 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	8

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	(Shapes Charts, Image, Header Footer, Page number) 3.2.3 Working with Formulas and Data Validation 3.2.4 Working with Sorting and Filtering	
4	**PRESENTATION AND DATABASE:** 4.**1 Creating and Editing a Presentation** 4.1.1 Changing Layout of a Presentation (Slide Design, Orientation, Themes, 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**	6
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

1) https://www.tutorialspoint.com/computer_fundamentals/index.htm
2) http://kvsecontents.in/computer-fundamentals
3) https://www.javatpoint.com/computer-fundamentals-tutorial
4) https://www.tutorialspoint.com/information_security_cyber_law/quick_guide.htm
5) https://www.tutorialspoint.com/internet_technologies/internet_overview.htm

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

* Assessment as per pro-forma II 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 play a fundamental role in education as well as technology. As 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) iii) 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 codes in formal & informal situations
iv) Speaking in formal & informal situations

COURSE OUTCOMES:

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

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

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 speeches, Group Discussion and Debate.	**08**	**04**
	COURSE OUTCOME CCG203-3 Write letters, reports, and e-mails in correct language.		
3	**Written Communication** 3.1 Characteristics of Written Communication. 3.2 Writing Reports: Accident, Progress & Fall in Production Reports 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 & Appearance and 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	**06**	**04**

	5.2 Planning, preparing and making a presentation 5.3 Use of presentation media		
	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 50 marks as per criteria given in *Workbook on Communication Skills*.

Domain	Particulars	Marks out of 50
Cognitive	Understanding	05
	Application	10
Psychomotor	Presentation Skills	10
	Drafting skills	10
Affective	Discipline and punctuality	10
	Decency	05
TOTAL		**50**

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

1) *www.clrp.cornell.edu/workshops/pdf/communication_skills-web.pdf*
2) http://depssa.ignou.ac.in/wiki/images/c/ca/Communication_skills_in_English.pdf *www*
3) *http://www.cgg.gov.in/Handbook%20on%20Communication%20Skills.pdf*
4) *http://www.stf-media.com/31-0-Presentations.html*
5) *www.speaking –tips.com*
6) *www.notesdesk.com*
7) *www.studylecturenotes.com*
8) *http://learnenglish.britishcouncil.org/en/content*
9) *www.languagelabsystem.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	00	

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 integrate 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 **]**

	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	-	-

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

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 – Greenhouse 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.	Willy, 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 Dehli.
5	Rao, C.S.	Environmental Pollution Control and Engineering.	New Age International Publication, 2007, ISBN: 81-224-1835-X

b) Websites

1) http://www.conserve-energy-future.com
2) http://www.cpcp.gov.in
3) http://www.indiaenvironmentportal.org.in
4) http://www.eco-prayerl.org
5) http://www.sustainable development.un.org
6) http://www.whatis.techtarget.com

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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	Nil
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: Summarize and classify philosophy of Indian culture of ancient, medieval and modern India.	-	-	-	-	1	-	-	-	-
CCG205-2: Distinguish the Indian languages and literature among different traditions.	-	-	-	-	1	-	-	-	-
CCG205-3: Differentiate between Dharma and Religion.	-	-	-	-	1	-	-	-	-
CCG205-4 : Acquire the information about the fine arts in India.	-	-	-	-	1	-	-	-	-
CCG205-5: Study the contribution of education systems of different eras in India.	-	-	-	-	1	-	-	-	-

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

CONTENT:

A) 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 meditators.	1) Collect information about meditation methods. 2) Meditate and interpret the mental state before and after the meditation sessions.	CCG205-3
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	1) Collect information of Indian ancient	CCG205-5

	"Nalanda University" and write a short-note about it with reference to its establishment, progress, contribution, causes of destruction etc.	universities. 2) Interpret their contribution in building India as a nation.	
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

B) THEORY:

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 कुटुंबकम् (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**

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	Vijay Kumar Publisher, 1989

		India"	
8.	Altekar. A. S.	Education in ancient India.	Banaras: Nanda Kishore & Bros. 1948.

b) Websites

1) https://nios.ac.in/online-course-material/secondary-courses/indian-culture-and-heritage-(223)-syllabus.aspx
2) http://ncert.nic.in/textbook/pdf/heih111.pdf

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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	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 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.

CC**G206-2:** 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, Experimentation and Testing	**PO 5** Engineering Practices for society, sustainability and Environment	**PO 6** Project Management	**PO 7** Life-long Learning	**PSO1**	**PSO2**
Competency : Understand philosophy of Indian constitution	0	1	1	0	1	1	2		
CCG206-1: Understand philosophy of Indian constitution	1	0	1	0	1	1	2		
CCG206-2: Know the formation process of state and central Government	0	1	1	1	2	1	2		
CCG206-3: Concept of Union Territory and provisions	0	1	1	1	1	1	2		
CCG206-4 : Indian Politics .	0	0	1	1	2	2	2		
CCG206-5: Study the Judiciary system in India	0	1	1	1	2	2	3		

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

CONTENT:

A) 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.

B) 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 Loksabha and Rajyasabha. 2.5 Union Territories and their limitations.	**6**
3	**Unit 3.** State Government. 3.1 Governor –Role and power. 3.2 Chief Minster 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 Zillah 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**

C) 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 administration at municipal corporation, tahasil and jilha panchayat.
6. Election commission and their responsibilities.
7. Judiciary system in India-District courts and their limitations.

Continuous Assessment of Practical Assignments: No practicals 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	Oxferd 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

Grade to the students should be allotted as follows:-

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

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LEVEL- III
BASIC TECHNOLOGY
COURSES

COURSE ID: IE/ET

Course Name : APPLIED MATHEMATICS

Course Code : EIG301

Course Abbreviation : GAMT

TEACHING AND EVALUATION SCHEME :

Pre-requisite Course(s) : CCG118

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	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2
Competency: to apply the mathematical techniques for engineering subjects.	3	2	3	2	-	-	1	2	1
EIG301.1 Apply the concept of integration to find the areas	3	2	2	-	-	-	1	2	1
EIG301.2 Solve Differential equation of first order and first degree by various methods	3	2	3	-	-	-	1	1	1
EIG301.3 Solve examples on Laplace Transform	3	2	3	1	2	-	1	3	2

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

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**
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**
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)
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**
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**

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

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

Topic No.	Name of topic	Distribution of marks (level wise)			Course Outcome	Total Marks
		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
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 MATERIA:

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

1) www.khanacademy.org
2) www.easycalculation.com
3) www.math-magic.com

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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:

Enhanced usage of electronic gadgets has made electronics engineers to deal with various types of electronic circuits, which generate required analog / digital output. Transistor has remarkably expanded the utility of electronic equipment. The learning of basic operating principles of electronic circuits will help the students to use basic electronic equipment. This course is developed in such a way that, students will be able to apply the knowledge of working of basic electronic circuits to solve broad based electronic engineering application problems. It mainly deals with linear-nonlinear wave shaping circuits, oscillators and power amplifiers.

COMPETENCY:

Build and test simple electronic circuits.

Cognitive: Explain applications of electronic circuits.
Psychomotor: Build circuits as per application and test it.
Affective: Follow safety practices, practice good housekeeping, demonstrate working as leader/a team member, maintain tools and equipment, follow ethical practices.

COURSE OUTCOMES: At the end of the course, student will be able to

EIG302-1. Comprehend the fundamental concepts in feedback amplifier.
EIG302-2. Use BJT for waveform generation of different frequencies.
EIG302-3 Assemble different wave shaping circuits and trace the output for various input waveforms.
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 : Build and test simple electronic circuits	3	-	2	2	--	--	3	3	--
EIG302-1. Comprehend the fundamental concepts in feedback amplifier.	3	-	-	--	-	-	--	--	--
EIG302-2. Use BJT for waveform generation of different frequencies.	3	-	2	2	--	--	--	3	1
EIG302-3 Assemble different wave shaping circuits and trace the output for various input waveforms.	3	-	2	2	-	--	--	3	1
EIG302-4 Analyze various power amplifiers and choose particular power amplifier as per requirement.	3	-		2	--	--	--	3	--
EIG302-5. Analyze transistor behavior as a switch and use it's switching property in multivibrator applications.	3	-	2	2	-	--	--	3	1
EIG302-6 Use sweep generators in electronics circuits	3	-	--	2	--	--	--	3	--

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication 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' experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Tuned circuit oscillator	Build and test performance of tuned oscillator	EIG 302-2
2.	Hartley Oscillator	Build and test performance of Hartely oscillator	EIG 302-2
3.	Colpitts Oscillator	Build and test performance of Colpitts oscillator	EIG 302-2
4.	RC phase shift Oscillator	Build and test performance of RC phase shift oscillator	EIG 302-2
5.	RC differentiator circuit	Build and test performance of RC Differentiator.	EIG 302-3
6.	RC Integrator Circuit	Build and test performance of RC Integrator.	EIG 302-3
7.	Positive Clipper	Build and test performance of positive clipper.	EIG 302-3
8.	Negative Clipper	Build and test performance of negative clipper.	EIG 302-3
9.	Combination Clipper	Build and test performance of combination clipper.	EIG 302-3
10.	Positive Clamper	Build and test performance of positive clamper.	EIG 302-3
11.	Negative Clamper	Build and test performance of negative clamper.	EIG 302-3
12.	Voltage doubler	Build and test performance of voltage doubler.	EIG 302-3
13.	Class A power amplifier	Build and test performance of class A power amplifier.	EIG302-4
14.	Complementary symmetry class B Power amplifier	Build and test performance of Complementary symmetry class B Power amplifier.	EIG302-4
15.	Single tuned Voltage amplifier	Build and test performance of single tuned voltage amplifier.	EIG302-4

16.	Astable Multivibrator using transistor	Build and test performance of Astable Multivibrator using transistor.	EIG 302-5
17.	Monostable multivibrator using transistor.	Build and test performance of Monostable Multivibrator using transistor.	EIG 302-5
18.	Bistable multivibrator using transistor	Build and test performance of Bistable Multivibrator using transistor.	EIG 302-5
19.	Schmitt trigger using transistor	Build and test performance of Schmitt trigger using transistor.	EIG 302-5
20.	Exponential sweep circuit	Build and test performance of Exponential sweep circuit	EIG 302-6
21.	Transistor switch sweep circuit	Build and test performance of Transistor switch sweep circuit.	EIG 302-6
22.	Miller sweep generator	Build and test performance of Miller sweep generator.	EIG 302-6
23.	Clipper circuit using simulation software	Simulate and check the output waveform of clipper circuit using simulation software.	EIG 302-3
24.	Clamping circuit using simulation software	Simulate and check the output waveform of clamping circuit using simulation software.	EIG 302-3
25.	Multivibrator circuit using simulation software	Simulate and check the output waveform of Multivibrator circuit using simulation software.	EIG 302-5

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 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) A doorbell using transistor
b) A clap switch Using transistor,
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 controller

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIG302-I Comprehend the fundamental concepts in feedback amplifier.		
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**
	EIG302-2. Use BJT for waveform generation of different frequencies.		
2	**Sinusoidal Oscillators** 2.1Positive feedback in oscillators 2.2 Barkhausen's Criteria 2.3Circuit Diagram, Working, frequency formula of following oscillators:- 2.3.1 Tuned circuit Oscillators 2.3.2 Hartley Oscillator 2.3.3 Colpitts oscillator . 2.3.4 RC phase-shift oscillator, 2.3.5 Wein Bridge oscillator 2.3.6 Crystal oscillator 2.4 Frequency stability consideration 2.5 Numericals based on oscillator frequency formulae	**08**	**14**
	EIG302-3 Assemble different wave shaping circuits and trace the output for various input waveforms.		

3	**Wave shaping Circuits** Circuit diagram, waveforms and operation of following: - 3.1 Linear wave shaping circuits. 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 3.2.1.1Positive 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.	**08**	**14**
	Sub Total	**24**	**40**

SECTION II

Sr. No.	**Topics**	**Lectures (Hours)**	**Theory Evaluation (Marks)**
EIG302-4 Analyze various power amplifiers and choose particular power amplifier as per requirement.			
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 PA 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**
EIG302-5. Analyze transistor behavior as a switch and use it's switching property in multivibrator applications.			

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**
EIG302-6 Use sweep generators in electronics circuits			
6.	**Sweep Generators** 6.1 Introduction to sweep waveform 6.2 Method of generating Voltage time base 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	06	06	--	EIG103-1	12
2	Sinusoidal Oscillator	02	04	08	EIG103-2	14
3	Wave shaping Circuits	02	04	08	EIG103-3	14
4	Power and Tuned Amplifier	02	08	06	EIG103-4	16
5	BJT Switching Circuits	02	04	06	EIG103-5	12
6	Sweep Generators	02	04	06	EIG103-6	12
	Total >>	**16**	**30**	**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 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/ Algoritm/ 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**

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	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

c) 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 Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 multi-meter.	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, temperature 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**	ct CRO & adjust intensity and focus re phase difference & frequency ratio sajous figure	EEIG303-4
8.	**Use of function generator**	1. connect function generator 2. Know front panel of function generator 3. Check different output functions using CRO	EIG303-5
9.	**Use of detectors for Ac bridge like headphone**	1. Connect circuit of AC bridge as per diagram	EIG303-2

		2. Detect the balancing condition	
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 mater 2. Know front panel of frequency meter 3. Measure different frequencies of signal	EIG 303-3
14.	**Use of any type of temperature transducer.**	1 Select appropriate transducer. 2.Meaure 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. 2. Note the parameters which affects its operation.	EIG303-6

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. Battery charger circuit
b. Low cost fire alarm circuit
c. Oscillator
d. Schmitt trigger
e. Opamp as adder, sub etc.
f. 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** 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,	**09**	**16**

	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,		
EIG303-4 Explain & demonstrate the use of CRO.			
4	**Oscilloscope** ***4.1*** Oscilloscope subsystems- *4.1.1* Display subsystems- CRT, Deflection of electron beam in CRT, Electrostatic and Electromagnetic deflection, sensitivity. 4.1.2 Vertical deflection subsystems- Input Coupling selector, Input attenuator, Pre-amplifier, Main vertical amplifier, delay line. 4.1.3 Horizontal deflection subsystems- Trigger circuit, Time base generator, Main Horizontal amplifier. 4.1.4 CRO Probes- General block diagram of CRO probe, passive voltage probe, and their compensation, Active Voltage probes, current probes. 4.1.5 Calibration circuits. *4.2* CRO-Block diagram of single beam dual trace and dual beam oscilloscope. *4.3* Block diagram of Digital storage oscilloscope. Uses of CRO- Frequency and phase measurement, Tracing of diode and transistor characteristics	**12**	**20**
EIF303-5 Explain & demonstrate various test & recording instruments			
5	**Signal Generator and Analyzer** *5.*1 Concept of oscillator. *5.2* Signal generator-AF and RF type- Block diagram and Operation only. 5.3 Function generator and pulse generator- Block diagram,Simple controls and operation only. 5.4 Specification. *5.5* Concept of time domain and frequency domain Instruments. *5.6* Spectrum & Logic analyzer- Block diagram and Operation only.	**08**	**12**
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**

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	
Marks	**--**	**--**	**--**	100E	**100**

* 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								
	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 Design and development**	**PSO2 Database and Network management**
Competency: Apply concepts of C Programming to solve engineering problems	2	2	3	3	-	1	1	1	-
EIG304-1	1	1	2	2	-	1	1	-	-
EIG304-2	2	2	3	3	-	1	1	1	-
EIG304-3	-	2	3	3	-	1	1	1	-
EIG304-4	1	2	3	3	-	1	1	1	-
EIG304-5	-	2	2	3	-	1	1	1	-

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication 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 Experiment	Skills to be developed	Course Outcome
01	Study of Flowcharts and Algorithm	• Understanding an Algorithm • Understanding the Flowchart • Study of various Flowchart Symbols	EIG304-1
02	Character set and Operators, Valid and invalid identifiers, variables and constants	• study of character set of C language • Various types of operator and their use • identifier, variables, constant, Keyword • Rules for valid variables, identifiers, constants.	EIG304-1
03	Write a C program to demonstrate different C. Operators and Expressions	• simple programming structure and Standard Header file • Understanding expression • Identify valid and invalid C expressions.	EIG304-1
04	Write a program to demonstrate the use of scanf() and printf function.	• Syntax and use of scanf() and prinf() function with example	EIG304-2
05	Write a program to demonstrate the use of character and string function.	• Using character input and output functions getchar() ,putchar() • Using string input and output functions gets(), puts()	EIG304-2
06	Write a program to demonstrate use of if, if-else structure (i) Determine whether a given year is a leap year or not.	• If statement - syntax and flowchart • If-else statement - syntax and flowchart	EIG304-3
07	Write a program to demonstrate use of Nested if, ladder if-else structure Write program to: i) Determine whether a string is palindrome.	• Nested if Else - syntax and flowchart • Else if ladder - syntax and flowchart	EIG304-3
08	Write a program to demonstrate the use of switch case statement Write programs to : (i) Print day of week by taking number from 1 to 7.	• use of switch statement • Syntax and flowchart of switch statement. • significance of break statement in switch case	EIG304-3

	(ii) Print a student's grade by accepting percent marks.	• use of default statement in switch case	
09	Implementation of Conditional and unconditional branching	• conditional and unconditional branching • syntax and use of go to statement • use of forward and backward jumping • break and continue statement	EIG304-3
10	Implementation of for loop: 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.	• definition of loop • syntax and flowchart of for loop • execution of for loop • nested for loop • Program based on for loop	EIG304-3
11	Write a program in C to display the pattern like right angle triangle using an asterisk.	• definition of loop • syntax and flowchart of for loo	EIG304-3
12	Write a program to demonstrate the use of while, do while	• 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 • execution of do while loop • program based on do while loop	EIG304-3
13	Write a program to produce the following output: 1 2 3 4 5 6 7 8 9 10	• execution of while loop • program based on while loop	EIG304-3
14	Write a program based on nested loop	• C program implementation on nested loop.	EIG304-3
15	Write a program to declare , modify and print elements of a given data array: i. Develop a Program to Sort list of 10 numbers.	• Understanding and use of an array • 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	EIG304-4
16	Write a program to copy one array into second array for given data elements.	• Understanding and use of an array • syntax to declare and initialize an array • read and print the elements of an array • access a particular element of an array	EIG304-4

		programs based on arrays	
17	Study of two dimensional array Write a program for— (i) storing elements in a matrix and printing it (ii) Write a program for printing sum of two matrices	• 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	EIG304-4
18	Program based on function Write a program to- i. To check whether a number is prime or not	• Understanding function • function declaration or prototype • syntax to define a function • function call • function parameters • function return value • Program using functions	EIG304-4
19	Write the program to add two numbers using function	• Understanding function • function declaration or prototype	EIG304-4
20	Program on recursion i) Find factorial of number using recursion	• Implement C program using recursion.	EIG304-4
21	Strings and string manipulation functions i)Program to find string length ii)Program to reverse string	• 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	EIG304-5
22	Write a program to demonstrate the use of all string handling functions.	• Programs on strings and string handling functions strcmp() strcpy(), strcat(), strupr(), strlwr(),	EIG304-5
23	Study of Structure (i) Create a structure 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.	• Understanding and syntax of structure • 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	EIG304-6
24	Write a program to demonstrate the use of Pointer: i. Write a program to use address operator (&) and pointer operator	• Understanding pointer • basic difference between variable and pointer	EIG304-5

	(*) for given data. ii. Write a program to access the array elements using pointer.	• declaration of pointer • Initializing pointer variable • program to access address of variable	
25	Complete a micro project based on guidelines provided		

Note: Any 20 practical's from sr. no. 1 – 24 can be performed and 25th no is compulsory.

A.2 Micro-project

Each student should allotted one micro project in the beginning of the semester. In 3rd 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:

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

B) 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, Identifiers & Keywords, 1.4 Data types and Variables 1.5 Declarations 1.6 Constants 1.7 Expressions 1.9 C Instructions 1.10 The first C program its Compilation & Execution	**05**
2	**OPERATORS& DATA INPUT AND OUTPUT FUNCTIONS** 2.1 Operators 2.1.1 Arithmetic & Assignment Operator 2.1.2 Unary operators 2.1.3 Relational & Logical Operators,	**05**

	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()	
Course Outcome EIG304 -2 Apply decisions 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) 3.1.2 Switch, break, continue, goto statement 3.2 Decision making and looping 3.2.1 While, do – while, for Statements 3.2.2 Nested loops	**06**

SECTION II

Sr. No.	Topics / Subtopics	Lectures (Hours)
Course Outcome EIG304 -3 *Implement users 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 pointer variable, accessing address of a variable	**5**

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 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 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

1) https://www.w3schools.in/c-tutorial/
2) www.cprogramming.com
3) www.learn-c.org
4) www.tutorialspoint.com/cprogramming
5) https://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 systems will help 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 Describe the basic communication system and calculate the noise at input and output.
EIG305-2 Explain and suggest appropriate modulation technique for given application.
EIG305-3 Identify different circuits in the communication transmitter and receiver.
EIG305-4 Measure and interpret receiver performance characteristics of a given radio receiver.
EIG305-5 Summarize antenna properties and discuss different types of antenna used for various applications.
EIG305-6 Describe the effect of atmospheric layers on electromagnetic wave propagation.

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

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

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic 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	1	1	-	-	1	1	2
EIG305-1	1	1	1	1	-	-	1	2	2
EIG305-2	2	1	1	1	-	-	1	2	2
EIG305-3	1	2	1	1	1	-	1	-	2
EIG305-4	2	2	1	1	1	-	1	-	2
EIG305-5	2	1	1	1	-	-	-	-	2
EIG305-6	2	1	-	-	-	-	1	-	2

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering in theoperation and maintenance of engineering application systems.
PSO 2: Supervision and providing solution: Ability to supervise work and reach appropriatesolution to simple practical problems in Electronics & Telecommunication 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 out of 15 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	Generate Amplitude modulation Wave	1. Trace the circuit. 2. Identify carrier, Modulating signal and modulated signal.	EIG305-2

2.	Observe Amplitude Modulated wave & calculate modulation index.	1. Observe AM waveform on CRO. 2. Measure parameters of AM wave on CRO. 3. Calculate modulation index	EIG305-2
3.	Observe trapezoidal pattern & calculate modulation index.	1. Observe various trapezoidal patterns on CRO. 2. Calculate modulation index using this pattern	EIG305-2
4.	Generate Demodulated wave of AM using Diode detector.	1. Identify Modulated and Demodulated signal. 2. Compare modulating and demodulated signals.	EIG305-2,4
5.	Generate Frequency modulated waveform.	1. Observe FM waveform on CRO. 2. Identify carrier, modulating signal. 3. Interpret frequency modulated signal.	EIG305- 3
6.	Observe Frequency Modulated wave & calculate modulation index.	1. Measure parameters of FM wave on CRO. 2. Calculate modulation index.	EIG305-3
7.	Generate demodulated wave of FM signal.	1. Observe FM and FM demodulated waveforms on CRO. 2. Observe similarities in modulated signal and demodulated signal.	EIG305-3, 4
8.	Visit to AM Transmitter	1. Observe different blocks of AM transmitter. 2. Explain operation of AM transmitter 3. Prepare a project report on the visit.	EIG305-1, 2, 4, 5
9.	Visit to FM Transmitter	1. Observe different blocks of FM transmitter. 2. Explain operation of FM transmitter 3. Prepare a project report on the visit.	EIG305-1, 3, 4, 5
10.	Identify different blocks of superheterodyne radio receiver.	1. Trace the radio receiver circuit using circuit diagram. 2. Identify different blocks & observe expected waveforms at various test points in Super-heterodyne	EIG305-1-5

		radio receiver 3. Identify different controls and their functions and measure the voltages at different check points.	
11.	Find Faults in Super-heterodyne receiver.	1. Locate faults using voltage and waveform technique at different check points and correct them.	EIG305-1-5
12.	Plot the selectivity and fidelity curve for Super-heterodyne radio receiver.	1. Give input AM wave from signal generator to the circuit and observe output on CRO. 2. Plot the selectivity & fidelity curve by varying carrier frequency. 3. Interpret the plots.	EIG305-4, 5
13.	Identify different blocks of FM radio receiver.	1. Identify different blocks & expected waveforms of demodulator circuit. 2. Identify different controls and their functions and measure the voltages at different check points.	EIG305-1, 3, 4, 5
14.	Plot radiation pattern of Yagi-Uda Antenna	1. Identify and describe parts of Yagi-uda antenna. 2. Measure radiated power at various locations to plot the pattern.	EIG305-5
15.	Observe Parabolic reflector (Dish Antenna).	1. Draw diagram of Dish antenna. 2. Identify and describe parts of Dish antenna for particular λ.	EIG305-5

A.2 Micro-project

Each student should be allotted one micro-project in the beginning of the semester. In 3rd 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 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

a) **Modulation**: Build 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 micro-strip 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 455 KHz.

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Teaching Hours	Theory Evaluation (Marks)
EIG305-1 Describe the basic communication system and calculate the noise at input and output.			
1	**Introduction to electronic communication system** **1.1** Elements of basic electronic communication system 1.2 Classification of electronic communication systems into Wired and Wireless, Uni-cast and Broadcast, simplex, half duplex and full duplex. 1.3 Noise Fundamentals, Types, Noise figure, Noise Temperature, 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 Explain and suggest appropriate modulation technique for given application.			
2	**Amplitude Modulation And SSB Techniques.** 2.1 Amplitude modulation theory. 2.2 Sidebands, Frequency domain representation and bandwidth of AM wave 2.3 Time domain representation of AM wave and Trapezoidal pattern. 2.4 Power relation in AM wave. 2.5 Amplitude modulator circuits. 2.6 AM Transmitters – Low level and High level 2.7 Single side band technique (SSB) 2.7. 1 Advantages and disadvantages of SSB 2.7.2 Suppression of carrier. 2.7.3 Suppression unwanted side band. 2.8 Concept of vestigial sideband & waveforms 2.9 Numerical problems based on AM & SSB theory.	**10**	**16**
EIG305-3 Identify different circuits in the communication transmitter and receiver.			
3	**Angle Modulation and FM Transmitters** 3.1 Frequency modulation and Phase modulation theory.	**08**	**14**

	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.		
	Sub-total	**24**	**40**

SECTION II

Sr. No.	Topics	Teaching hours	Theory Evaluation (Marks)
EIG305-4 Measure and interpret receiver performance characteristics of a given radio receiver.			
4.	**Radio Receivers** 4.1 AM Receivers 4.1.1 TRF receivers, Super heterodyne receiver. 4.1.2 Receiver performance characteristics 4.1.3 RF section 4.1.4 Frequency mixer and down converters 4.1.5 Image frequency and its rejection 4.1.6 IF amplifiers 4.1.7 AM detector 4.1.8 AGC circuits. 4.2 FM receivers: 4.2.1 FM discriminators – slope detector, ratio detector, PLL detector (Basic working of PLL to be covered) 4.2.2 Pre-emphasis and De-emphasis	**10**	**18**
EIG305-5 Summarize antenna properties and discuss different types of antenna used for various applications.			
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. 5.9Parabolic reflector antenna	**06**	**10**
EIG305-6 Describe the effect of atmospheric layers on electromagnetic wave propagation.			
6.	**Electromagnetic Wave Propagation** 6.1 Electromagnetic waves and polarization 6.2 Reflection, refraction, diffraction of waves	**08**	**12**

	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		
	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	-	**EIG305-1**	10
2.	Amplitude modulation and SSB technique.	04	08	04	**EIG305-2**	16
3.	Angle modulation and FM transmitters	04	06	04	**EIG305-3**	14
4.	Radio receivers	04	10	04	**EIG305-4**	18
5.	Antennas	04	06	-	**EIG305-5**	10
6.	Electromagnetic Wave Propagation	06	06	-	**EIG305-6**	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

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.*

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.	George Kennedy	Electronic Communication Electronics	TMH Publication
3	Louis Frenzel	Communication Systems	TMH Publication
4	Roddy Coolen	Electronic Communication	PHI Publication

b) Websites

1) *www.nptel.ac.in*
2) *www.antenna-theory.com*
3) *www.explainthatstuff.com/antennas.html*
4) *www.circuitstoday.com/single-chip-fm-radio-circuit*

***

COURSE ID:

Course Name : DIGITAL TECHNIQUES & APPLICATIONS
Course Code : ETG306
Course Abbreviation : GDTA

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	50E	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:

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:

ETG306-1: Use number system and codes for interpreting working of digital system.
ETG306-2: Use Boolean expressions to realize logic circuits.
ETG306-3: Analyze different Logic families & working of basic logic gates.
ETG306-4: Build simple combinational circuits.
ETG306-5: Build simple sequential circuits.
ETF 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
ETG306-1	2	3	1	-	-	-	1	1	-
ETG306-2	2	3	3	-	-	-	1	3	2
ETG306-3	2	2	2	-	-	-	1	3	3
ETG306-4	2	3	3	1	-	-	1	3	3
ETG306-5	2	3	3	1	-	-	1	3	3
ETG306-6	2	3	3	1	-	-	1	3	3

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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' 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	1) Identification of IC's. 2) Testing of logic gates.	ETG306-2

	7404,7408,7432,7486)		
2.	Test the functionality of NAND & NOR logic gates using breadboard. (IC 7400 & 7402)	1) Identification of IC's. 2) Testing of logic gates.	ETG306-2
3.	Construct AND, OR & NOT gates using Universal gates NAND & NOR	1) Buiding circuit on breadboard. 2) Verifying the output with truth table of each gate.	ETG306-2
4.	Build the logic circuit on breadboard to check the De Morgan's theorems for 2 input variables.	1) Buiding circuit on breadboard. 2) Verifying the output with truth table of each gate.	ETG306-2
5.	Design Half adder & Full adder using Boolean expressions	----- '' -----	ETG306-43
6.	Design Half subtractor & Full subtractor	----- '' -----	ETG306-4
7.	Construct & test BCD to 7-segment decoder using IC 7447/7448	----- '' -----	ETG306-4
8.	Build & test fuction of MUX using IC 74151/74150/any other equivalent	----- '' -----	ETG306-4
9.	Build / test function of DEMUX IC 74155/74154/any other equivalent	----- '' -----	ETG306-4
10.	Build and test Priority encoder using IC 74147	----- '' -----	ETG306-4
11.	Build/ test function of RS flip flop using NAND gate	----- '' -----	ETG306-5
12.	Build & test function of JK flip flop using IC 7476	----- '' -----	ETG306-5
13.	Use IC 7476 to construct & test the functionality of D and T flip flop.	----- '' -----	ETG306-5
14.	Build 4-bit Right Shift Register using D flip flop IC 7474	----- '' -----	ETG306-5
15.	Implement 4-bit ripple counter using IC 7476.	----- '' -----	ETG306-5
16.	Use IC 7490 to construct BCD and Mod-6 counter.	----- '' -----	ETG306-5
17.	Build MOD-12 Synchronous UP counter using IC 74160.	----- '' -----	ETG306-5

A.2 Suggestive Micro-project list:-

Each student should be allotted one microproject in the beginning of the semester. In 3nd and 4th semester the microprojects are group based (group of 3 students) and in 5th and 6th semesters it should be preferably individualy 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. Buid 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.

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
ETG306-1: Use number system and codes for interpreting working of digital system.			
1	**Number system & codes** 1.1 Definition of Digital signal, digital systems, Advantages of digital systems, positive and negative logic, 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 & subtraction using 1's & 2's compliment 1.7 Octal, Hexadecimal addition & subtraction 1.8 BCD addition & subtraction using 9's and 10's compliment. 1.9 ASCII code	08	12
ETG306-2: 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)	**09**	**16**

	2.4 NAND and NOR gates as Universal gates 2.5 Sum of Product(SOP) and Product of Sum(POS) reduction methods. 2.6 Maxterm and Minterm, 2.7 Standard conversion between SOP and POS form 2.8 K – map reduction techniques (upto 4 variables only SOP equations) with Don't care condition		
ETG306-3: 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) 3.4 Comparison of logic families TTL & CMOS.	**07**	**12**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
ETG306-4: 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, demultiplexer tree. 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**
ETG306-5: 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.	**10**	**16**

	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 & 10) 5.10 Study of IC's 7474, 7490, 74193, 74160, 7476, (logic Diagram and truth table only expected.)		
ETG 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 6.6 Flash memory	**4**	**8**
	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	ETG306-1	12
2	Boolean algebra	4	6	6	ETG306-2	16
3	Digital logic families	2	4	6	ETG306-3	12
4	Combinational Logic Circuits	2	6	8	ETG306-4	16
5	Sequential Logic Circuits	2	6	8	ETG306-5	16
6	Data converters and Memories	2	2	4	ETG306-6	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

a) 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**.

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

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

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
4. Google meet or Zoom platforms.

Teaching and Learning resources:

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

REFERENCE MATERIA:

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.

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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 focuses 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:

At the end of the course, student will be able to

EIG307-1. Select the proper op-amp with appropriate parameters for a given industrial application**.**
EIG307-2. Identify the type of op-amp configuration and use it as per requirement .
EIG307-3 Analyze the operation of linear and non-linear applications of op-amp and use it as per requirement.
EIG307-4 Describe the operation of op-amp based circuits for waveform generation and use it as per requirement.
EIG307-5 Illustrate operation of active filters and design various types of filters.
EIG307-6 Analyze the operation of IC555 based circuits and use it 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 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 Electronics & Telecommunication engineering 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 & Telecommunication 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 an 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 be allotted one microproject in the beginning of the semester. In 3^{rd} and 4^{th} semester the microprojects are group based (group of 3 students) and in 5^{th} and 6^{th} 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 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.

a) Build Instrumentation amplifier (IC LM324) for measuring of temperature using thermistor/RTD/Thermocouple.
b) Build sound sensor circuit IC 741 and microphone
c) Build Clamp switch using IC741
d) Build shadow sensor circuit using IC741
e) Develop tone generator using IC555
f) Develop PWM LED Dimmer/Brightness control using IC55
g) 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)
EIG307-1. Select the proper op-amp with appropriate parameters for a given industrial application.			
1	**Basics Of Operational Amplifier** 1.1 Differential amplifier-basics 1.2 Circuit Diagram and circuit description only: DIBO,DIUO,SIBO,SIUO 1.3 Block diagram of OP-Amp: 1.3.1 Input Stage 1.3.2 Intermediate Stage 1.3.3 Level Shifting Stage: Need and circuit diagram 1.3.4 Output Stage: Circuit Diagram 1.4 Op-Amp IC-741 pin diagram and function. 1.5 Equivalent Circuit, Circuit Symbols And Terminals 1.6 Ideal OP-AMP and transfer curve Electrical parameters of 741 1.7 Input offset voltage, Input offset current, Input bias current, Differential input resistance, Input capacitance, Offset voltage adjustment range, Input voltage range, CMRR, SVRR, Large signal voltage gain, Output voltage swing, Output resistance, Output short circuit current, supply current, Power consumption, Slew rate.	06	12
EIG307-2. Identify the type of op-amp configuration and use it as per requirement			
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:-**	10	14

	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.		
EIG307-3 Analyze the operation of linear and non-linear applications of op-amp and use it as per requirement.			
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.	0 8	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)
EIG307-4 Describe the operation of op-amp based circuits for waveform generation and use it as per requirement			
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	08	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	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.		
EIG307-5 Analyze operation of active filters and design various types of filters			
5	**Active filters** 5.1 Introduction to filters ,Classification of filters, 5.2 Concept of passive and active filters 5.3 Merits and demerits of active filters over passive filters 5.4 Definition:-cut off frequency, Pass band, Stop band, center frequency, roll off rate, BW, Q-factor 5.5 Realistic and ideal response curve of LP, HP,BP, BP, notch filters. 5.6 Order of filter and Need of higher order filter **Circuit Diagram, frequency response, operation equation for gain and cut-off frequency(no-derivation) for following filters:-** 5.7 First order Butterworth Low pass and high pass filters using op-amp 5.8 Second order Butterworth Low pass and high pass filters using op-amp 5.9 Band pass filter (wide band pass , narrow band pass filter) 5.10 Band reject filter(wide band reject, narrow band reject filter) Numerical examples on design of op-amp filters 1st order and 2nd order filters(LPF & HPF)	10	16
EIG307-6 Analyze the operation of IC555 based circuits and use it as per requirement			
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 6.5 Application of IC555 as Water level controller, VCO and Schmitt Trigger	06	10
	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	14
5	Active filters	04	06	06	EIG307-5	16
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 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 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	Drischoll	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 : EIG308
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:

EIG308-1 Apply different rules and laws for circuit analysis.
EIG308-2 Differentiate series and parallel circuits and analysis of different networks.
EIG308-3 Predict circuit responses using network theorems.
EIG308-4 Design RC circuits
EIG308-5 Analyze output of resonant circuits.
EIG308-6 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 Apply different rules and laws for circuit analysis.	3	2	2	2	-	1	3	2	2
EIG 308 -2Differentiate series and parallel circuits.	3	2	-	2	-	1	3	2	1
EIG 308 -3 Predict circuit responses using network theorems.	3	2	2	2	-	2	3	3	2
EIG 308 -4 Design RC circuits	3	2	2	2	-	2	3	1	1
EIG 308-5Analyze output of resonant circuits.	3	2	-	2	-	1	2	1	1
EIG 308-6 Select appropriate filters as per requirement	3	-	2	1	1	-	3	1	1

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

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	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	EIG 308-1

		3.Formulation of result 4. Plotting of graph	
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 2.Calculation of parameters 3.Formulation of result	EIG 308-1
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 micro project in the beginning of the semester. In 2nd, 3rd 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 CO's.
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:

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)Theremin'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 tuned it to resonance condition and find out quality factor and bandwidth)

i) Resonance circuit (Build parallel RLC resonance circuit on PCB and tuned 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 semi log paper)

k) High pass filter (Build RC high pass filter for given cut off frequency on PCB and draw its response on semilog paper)

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	EIG 308-1 Apply different rules and laws for circuit analysis		
1	**BASIC THEORY** 1.1 Electric charge and current 1.2 AC and DC circuits 1.3 Short and open circuit 1.4 Ohm's law 1.5 Energy and power in resistor circuits 1.6 Kirchhoff's voltage law 1.7 Kirchhoff's current law 1.8 Voltage divider rule 1.9 Current divider rule **(Numerical on above topic)**	**08**	**14**

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

SECTION II

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 **(Numerical on above topic)**	**10**	**14**
	EIG 308-5Analyze 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) **(Numerical on above topic)**	**06**	**10**
	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

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

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algoritm/ 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.*

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	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

1) www.tatamcgrawhill.com
2) www.mhne.com/ravish/ens
3) www.electrical4u.com/rlc-circuit
4) https://www.electricaltechnology.org/category/basic-electrical-fundamentals
5) https://www.elprocus.com/basics-of-network-theorems-in-electrical-engineering
6) https://www.oreilly.com/library/view/introduction-to- electric/9781118477502/ 12_chap05.html
7) https://electrical-engineering-portal.com/resources/knowledge/theorems-and-laws
8) http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=93231
9) https://learnabout-electronics.org/ac_theory/filters81.php

* * *

COURSE ID:

Course Name : MICROCONTROLLERS

Course Code : EIG309

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 student's 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/Design 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	1	-	-	-	-	-	-
EIG 309-2	2	2	1	-	-	-	1	-	-
EIG 309-3	2	2	2	1	-	1	1	-	2
EIG 309-4	1	3	3	1	-	1	1	2	2
EIG 309-5	1	3	2	1	-	1	1	2	2

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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.	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	1) Use KEIL compiler software for assembly language programming 8051microcontroller	EIG309-2

	their use.	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 no's, 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 problemWriting, Compiling, debugging, and execution of program	EIG309-3,4
11.	Develop and execute Assembly language program for LED blinking/LED sequences	1) Acquire Logical thinking ability 2) Interfacing LED with 8051 MC 3) Identify the suitable instructions for	EIG309-3,4

	using delay/timer mode.	the given problem 4) Writing, Compiling, debugging, and execution of program	
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 4) Writing, Compiling, debugging, and execution of program	EIG309-3,4,5

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 micro project in the beginning of the semester. In 3rd 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:

a) Prepare a chart of various features using data sheets of 8051 microcontroller and its derivatives
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 class period 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 Temperature controller for given parameters.
j) 4 Channel Quiz Buzzer using 8051 Microcontroller
k) Digital Voltmeter using 8051 Microcontroller:

B) 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 Elements of Microcomputer (Buses Microprocessor, Memory, I/O devices) 1.1.3 Types of buses (Address, Data and control bus) 1.2 Types of architectures: Von Neumann and Harvard 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 Microcontroller 1.5.4 ARM Microcontroller 1.5.5 Compare all listed microcontroller with the parameters(Bits,Memory,instruction set & memory architecture) 1.6 Introduction to Microcontroller programming simulation software like – KEIL compiler	**6**	**10**
EIG309-2 Interpret the salient architectural features of 8051 microcontroller			
2	**Architecture of 8051 Microcontroller**	**8**	**12**

	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.		
EIG309-3 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**
EIG309-4 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 4.3Timer/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**
EIG309-4 Interface and program different I/O devices with 8051 in assembly			
5	**Serial communication and Interrupt programming** 5.1 Serial port of 8051 5.1.1Serial 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. 5.2.2Interrupts SFRs: IE,IP 5.2.3 Simple programs based on interrupts and polling	**8**	**16**

SECTION I

Sr. No.	Topics	Teaching hours	Marks
	Sub-total	24	40

	method 5.3 Memory interfacing: Program and data memory		
EIG309-5 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:

Topic No.	Name of topic	Distribution of marks (Cognitive level-wise)			Course Outcome	Total Marks
		Remember	Understand	Application		
1	Introduction to Microcontrollers	02	04	04	EIG309-1	10
2	Architecture of Microcontroller8051	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

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 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 / 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

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COURSE ID:

Course Name : DIGITAL COMMUNICATION
Course Code : ETG310
Course Abbreviation : GDCM

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	50I	**150**

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

RATIONALE:

Digital transmission offers data processing option and flexibility which is not available with analog transmission. Digitalization has moved into every corner of the workplace. By eliminating the need for time-consuming face to face interactions, digital communication in various forms makes it easier for customers to reach out to organizations at a time that is convenient and non-disruptive to them. This is technology group subject, which will enable student to comprehend facts, concepts & working principle of digital communication system. It also familiarizes the student with information theory, measurement of information rate &capacity. This subject helps the student to understand the concept of various pulse modulations, Digital modulation techniques, coding methods and error control, multiplexing & multiple access techniques and S.S. modulation. The knowledge acquired by students will help them to apply it in various modern communication systems.

COMPETENCY:

Recognize and collect detail knowledge about digital communication system.

Cognitive : Acquire basic knowledge of digital communication concepts**.**

Psychomotor : Discover different modulation technics practically.

Affective : Proficiency in knowledge of digitization and communication of signal

COURSE OUTCOMES:

ETG310-1 Identify basic components in Digital Communication and describe its functions.
ETG310-2 Classify, compare and illustrate the operation of pulse modulation systems
ETG310-3 Analyze working of of digital modulation systems.
ETG310-4 Use Coding methods and Error control techniques as per need
ETG310-5 Illustrate working principle of different Multiplexing and Multiple access techniques.
ETG310-6 Describe working principle of Spread spectrum modulation 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	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: Recognize and collect detail knowledge about digital communication system.	2	2	2	2	1	2	2	2	3
ETG310-1	1	1	1	-	-	-	-	2	2
ETG310-2	2	2	2	2	1	2	-	3	3
ETG310-3	2	2	2	2	1	2	2	-	3
ETG310-4	2	3	2	2	-	2	2	2	3
ETG310-5	2	2	1	2	1	1	2	2	2
ETG310-6	1	1	-	1	-	1	1	2	1

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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' experiments, out of which microproject is compulsory).

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	Pulse Amplitude modulation / demodulation	1) Understand pulse amplitude modulation/demodulation	ETG310-2

		2) Understand sampling 3) Analyze the modulated waveforms	
2.	Pulse width modulation /demodulation	1) Make connections on kit 2) test the performance of circuit 3) Analyze the waveforms	ETG310-2
3.	Pulse Position modulation/demodulation	1) Understand pulse Position modulation 2) Make connections on kit 3) Analyze the waveforms	ETG310-2
4.	Pulse code modulation and demodulation.	1) Understand pulse code modulation 2) Make connections on kit 3) Analyze the waveforms	ETG310-2
5.	Write a programme using any simulation software to observe sampling process for sampling rate less than, equal to ,greater than Nyquist rate.	1) Write a program in software 2) Observe for sampling rate is less than Nyquist rate 3) Observe for sampling rate is equal to Nyquist rate 4) Observe for sampling rate is greater than Nyquist rate	ETG310-2
6.	Delta modulation.	1) Understand Delta modulation 2) Make connections on kit 3) Analyze the modulated waveforms	ETG310-3
7.	Adaptive delta Modulation.	1) Understand Adaptive Delta modulation 2) Make connections on kit 3) Analyze the modulated waveforms	ETG310-3
8.	ASK modulation & demodulation.	1) Understand ASK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	ETG310-3
9.	FSK modulation & demodulation.	1) Understand FSK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	ETG310-3
10.	PSK modulation & demodulation.	1) Understand PSK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	ETG310-3
11.	QPSK modulation & demodulation.	1) Understand QPSK modulation 2) Make connections on kit 3) Analyze the modulated and demodulated waveforms	ETG310-3
12.	Construct the circuit for generation of Hamming code for 4 bit data	1) Build a circuit for generation of Hamming code	ETG310-4
13.	Construct the circuit for one bit error correction using Hamming code	1) Build a error correction circuit using Hamming code.	ETG310-4
14.	Generate a TDM signal using any simulation software	1) Write a program in software 2) generate TDM using the software	ETG310-5
15.	Generate a FDM signal using any	1) Write a program in software	ETG310-5

	simulation software	2) generate FDM using the software	

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 individualy 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:

1) Built a parity generator or checker using gates/IC.
2) Built a checksum generator.
3) Built a transistorized chopper to study sampling
4) Develop a circuit to generate ASK
5) Develop a circuit to generate FSK
6) Built PN sequence generator.
7) Generate ASK signal generator for two different bit patterns.
8) Build a circuit to transmit 2 different signals simultaneously using same medium.
9) Any other

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
***ETG310-1 Identify* basic components in Digital Communication and describe its functions.**			
1	**Introduction of Digital Communication** 1.1 Basic digital communication system(block diagram and function of each block) 1.2 Channel capacity-definition ,equation 1.3 Hartleys law, Shannon-Hartley theorem 1.4 channel noise and its effect 1.5 Entropy (definition and equation) 1.6 Advantages and disadvantages of digital communication ,Comparison between analog and digital communication	4	8
ETG310-2 Classify, compare and illustrate the operation of pulse modulation systems			
2.	**Pulse Communication** 2.1 Introduction, comparison with Continuous Wave Modulation, advantages	10	16

	2.2 Sampling: sampling theorem, Nyquist rate, and aliasing, natural & flat top. 2.3 PAM, PWM, PPM (definition, generation, block diagram, waveform analysis, and their comparison.) 2.4 Pulse code modulation- block diagram of PCM transmitter & receiver, 2.5 Quantization, quantization error 2.6 Companding, 2.7 Inter symbol interference 2.8 Delta modulation- block diagram of DM, slope overload, granular noise. 2.9 ADM, DPCM, block diagram and its working.		
ETG310-3 Analyze working of of digital modulation systems.			
3	**Digital Modulation Techniques** Definition & waveforms, their transmitter and receiver block diagram and working for following types: 3.1 ASK:BASK,QAM 3.2FSK:BFSK ,MFSK 3.3 PSK:BPSK,QPSK,MPSK 3.4 Bandwidth, spectrum for each modulation technique and their comparison.	10	16
	Subtotal	24	40

SECTION II

Sr. No.	Topics	Teaching hours	Marks
ETG310-4 Use Coding methods and Error control techniques as per need			
4.	**Coding methods and Error control** 4.1 Baud rate, Bit rate. 4.2 Line coding - unipolar, bipolar – NRZ, RZ, Manchesterd 4.3 Source coding, shannon fano coding , Huffman coding. 4.4 Channel coding: Error, Causes of error and its effects, error detection& correction using parity, Hamming code & CRC code simple numerical. 4.5 Comparison between different coding	10	16
ETG310-5 Illustrate working principle of different Multiplexing and Multiple access techniques.			
5	**Multiplexing and Multiple Access** 5.1 Need of Multiplexing, 5.2 TDM, FDM, CDM, definition , block diagram and their comparison. 5.3 Introduction to WDM.	8	14

	5.4 E & T carrier multiplexing hierarchy 5.5 Access technique –Introduction, need and methods 5.5.1 TDMA . 5.5.2 FDMA 5.5.3 CDMA 5.6 Advantages of TDMA over FDMA.		
ETG310-6 Describe working principle of Spread spectrum modulation techniques.			
6.	**Spread spectrum modulation** 6.1 Introduction, PN Sequence, spread spectrum modulation 6.2 block diagram of spread spectrum modulation system. 6.3 Direct sequence spread spectrum signal. 6.4 Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping, comparison of FHSS and DSSS 6.5 Application S. S. modulations.	6	10
	Subtotal	**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 of Digital Communication	4	2	2	ETG310-1	8
2	Pulse Communication	2	6	8	ETG310-2	16
3	Digital Modulation Techniques	4	6	6	ETG310-3	16
4	Coding methods and Error control	2	6	8	ETG310-4	16
5	Multiplexing and Multiple Access	2	4	8	ETG310-5	14
6	Spread spectrum modulation	4	4	2	ETG310-6	10
TOTAL		18	28	34	**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

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/ Algoritm/ 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 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	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 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.PPTs 4. Question Bank 5. Charts

REFERENCE MATERIAL:

a) Books / Journals / IS Codes

Sr.No.	Author	Title	Publications
1	Sanjay Sharma	Digital Communication	S.K.Kataria and sons
2	Wayne Tomasi	Electronic communication system	Pearson
3	R.P.Singh,S.D.Sapre	Communication Systems	Tata Mcgraw hill
4	Rao,Ramkrishna P.	Digital Communication	Tata Mcgraw hill

b) Websites

1) www.pearsoned.co.in/waynetomasi
2) www.skkatariaandsons.com
3) www.nptelvideos.in

* * *

COURSE ID:

Course Name : BASICS OF POWER ELECTRONICS
Course Code : ETG311
Course Abbreviation : GPTX

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 10 marks	(i) 25 marks for each practical (CA) (ii) One PST of 25 marks	One Paper (2 hours)	Term End oral / Micro-project Exam (3 hours)	
Marks	10	--	40	50I	**100**

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

RATIONALE:

Electronic control circuits play major role in industries. In this era of automation in industry and manufacturing sector, the mechanical controls are largely replaced by power electronic devices. In this context this course aims at acquainting the pass outs with the basic principles and applications of basic power electronics devices, so that they can maintain the control circuits used in the field.

COMPETENCY:

Acquire knowledge about various electronic semiconductor devices from thyristor family & maintain power electronic devices in electronic circuits

Cognitive: Expalin operating principle, characteristics of semiconductor electronic switches from thyristor family.

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

Affective: Follow safety practices, practice good housekeeping, demonstrate working as leader/a team member, maintain tools and equipment, follow ethical practices.

COURSE OUTCOMES: At the end of the course, student will be able to

ETG 311-1 Explain the operation of electronic semiconductor switches from thyristor family.
ETG 311-2 Maintain the triggering circuits of thyristors.
ETG 311-3 Operate and maintain commutating circuits of thyristors.
ETG 311-4 Analyse series and parallel connections of SCR
ETG 311-5 Demonstrate 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 devices from thyristor family & maintain power electronic devices in electronic circuits.	2	--	--	2	--	--	--	3	--
ETG 311 -1	2	--	--	2	--	--	--	3	--
ETG 311 -2	2	--	--	2	--	--	--	3	--
ETG 311 -3	2	--	--	2	--	--	--	3	--
ETG 311 -4	2	--	--	--	--	--	--	3	--
ETG 311 -5	2	--	--	2	--	--	--	3	--

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

CONTENTS:

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 '12' experiments).

Laboratory experiments and related skills to be developed:

Sr. No.	Title of Experiment	Skills / Competencies to be developed	Course Outcome
1.	Plot the characteristics of SCR and measure holding current and latching current	1. Build experimental setup to plot the VI characteristic of SCR 2. Plot VI characteristics of SCR 3. Measure Holding and latching current of SCR	ETG 311-1
2.	Plot the characteristics of Diac and determine the breakover voltage of Diac	1. Build experimental setup to plot the VI characteristic of Diac 2. Plot VI characteristics of Diac 3. Determine breakover voltage of the Diac	ETG 311-1
3.	Plot the characteristics of Triac and determine breakover voltage of Traic in FB and RB.	1. Build experimental setup to plot the VI characteristic of Triac 2. Plot VI characteristics of Triac 3. Determine breakover voltage in FB and RB	ETG 311-1
4	Plot the characteristics of UJT.	1. Build experimental setup to plot the VI characteristic of UJT 2. Plot VI characteristics of UJT 3. Determine peak voltage	ETG 311-1
5.	R –firing circuits	Build and test the R-firing circuit	ETG 311-2
6.	RC- Firing circuits	Build and test the RC-firing circuit	ETG 311-2
7.	UJT Firing circuits	Build and test UJT firing circuit	ETG 311-2
8.	PUT Firing circuits	Build and test UJT firing circuit	ETG 311-2
9.	Phase control using Diac and Triac.	Build and test the performance of Triac triggering circuit using Diac	ETG 311-2
10.	Flasher using SCR.	Build and test the performance of flasher circuit using SCR	ETG 311-2
11.	Test the performance SCR commutation circuits (Class A, B, C)	Build and test the performance of commutation circuit	ETG 311-3
12.	Test the performance SCR commutation circuits (Class D, E, F)	Build and test the performance of commutation circuit	ETG 311-3
13.	Test the performance of Half wave-controlled rectifier with R load.	Build and test the performance of half wave-controlled rectifier circuit	ETG 311-5
14.	Test the performance of centre tap Full wave-controlled rectifier with RL load and freewheeling diode.	Build and test the performance of centre tap full wave-controlled rectifier circuit	ETG 311-5
15.	Test the performance of Full wave-controlled bridge rectifier with R load.	Build and test the performance of full wave-controlled bridge rectifier circuit.	ETG 311-5

A.2 Micro-project

Each student should allot 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:

a) Construct UJT firing circuit.
b) Develop Fan speed control using TRIAC and DIAC
c) Build Light dimmer.
d) Develop SCR flasher.
e) Develop Battery charger circuit using SCR.
f) Build Automatic hand sanitizer.
g) Develop Home security system
h) Construct Solar power generator system
i) Build Thyristor power control by IR remote.
j) Develop Speed control of stepper and DC motor.

B) THEORY:

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
ETG 311-1 Explain the operation of electronic semiconductor switches from thyristor family.			
1	**Power Electronic Semiconductor Switches** 1.1 Need for high power semiconductor switches. 1.2 Ideal switch characteristics 1.3 SCR 1.3.1 Symbol, Construction (doping levels of layers), working 1.3.2 Transistorized equivalent circuit of SCR and its working 1.3.3 VI Characteristics of SCR 1.3.4 Specifications- Anode current, holding & latching current, on state voltage, breakover voltage, turn on and turn off time etc. 1.4 TRIAC 1.4.1 Layer diagram, operating principle 1.4.2 four modes of operation 1.4.3 VI characteristics. 1.5 Triggering devices– layer diagram, VI characteristics, operating principle, specifications of	12	10

	1.5.1 DIAC 1.5.2 UJT 1.5.3 PUT		
ETG 311-2 Maintain the triggering circuits of thyristors.			
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 2.1.4 Light triggering 2.1.5 Temp triggering. 2.2 Advantages of gate triggering. 2.3 Pulse triggering (using active components) Requirements of pulse to trigger SCR successfully, Pulse width, Pulse amplitude & gate current. 2.4 R- Firing circuits 2.5 RC- Firing circuits 2.6 UJT relaxation oscillator: Circuit, Operating principle, Waveforms 2.7 PUT relaxation oscillator: 2.7.1 Circuit, Operating principle, Waveforms 2.7.2 Advantage of PUT over UJT. 2.8 Triac triggering using Diac.	10	06
ETG 311-3 Operate and maintain commutating circuits of thyristors.			
3	**Commutation Circuits of Thyristors** 3.1 Turn off mechanism of SCR 3. 2 Types of commutation methods. 3.2.1. Resonant turn off - Class A, Class B 3.2.2. Parallel Capacitance turn off using auxiliary SCR - Class C, Class D 3.2.3 External pulse turn off - Class E 3.2.4 Natural turn off - Class F	***08***	***06***
ETG 311-4 Analyze Series and parallel connections of SCR			
4	**Series And Parallel Connections 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 (Derivations of R, C calculations and numerical based on it)	**06**	**06**

ETG 311-5 Demonstrate Controlled rectifier circuit			
5	**AC to DC Converter -Controlled Rectifier** 5.1 Controlled Rectifiers: Meaning, AC phase control principle. 5.2 Half wave-controlled Rectifier 5.2.1 Single phase half wave-controlled rectifier with resistive load circuit, Operation, waveforms 5.2.2 Single phase half wave-controlled rectifier with RL load: Concept of inductive load with example, Circuit, operation, waveforms 5.2.3 Concept of load & source (review) 5.2.4 Concept of two quadrant operation, power feedback (Regeneration), power factor. 5.2.5 Single phase half wave-controlled rectifier with RL load & freewheeling diode: circuit, Operation, waveform 5.3 Full wave-controlled Rectifier 5.3.1 Single phase center-tapped full wave-controlled rectifier with Resistive load- Circuit, operation and waveforms. 5.3.2 Single phase center-tapped full wave-controlled rectifier with RL load- Circuit, operation and waveforms. 5.3.3 Single phase center-tapped full wave-controlled rectifier with RL load and freewheeling diode- Circuit, operation and waveforms. 5.3.4 Single phase full wave bridge-controlled rectifier with Resistive load - circuit, Operation and waveforms 5.3.5 Single phase full wave bridge-controlled rectifier with RL load - Circuit, operation and waveforms 5.3.6 Single phase full wave bridge-controlled rectifier with RL load and freewheeling diode- Circuit, operation and waveforms	**12**	**12**
	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:

Section / Topic no.	Name of topic	Distribution of marks				Total marks
		Knowledge	Comprehension	Application	Course outcome	
1	Semiconductor switches	2	8	-	ETG311-1	10
2	Triggering methods of Thyristor	2	4	-	ETG311-2	06
3	Commutation circuits of Thyristors	2	4	-	ETT311-3	06
4	Series and parallel connections of SCR	2	2	2	ETG311-4	06
5	AC to DC converter-controlled rectifier	4	4	4	ETG311-5	12
	Total	12	22	06		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

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/Algoritm/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.*

b) Assessment Criteria for Term-end Oral Examination:

Every student has to perform one practical within 3 hours at semester end oral 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. 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.	Deodatta Shingare	Industrial and Power Electronics	Tata McGraw Hill
2.	P.C. Sen	Power Electronics	Tata McGraw Hill
3	M.D.Singh & K.B.Khanchandani	Power Electronics	Tata McGraw Hill

b) Websites:

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

* * *

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, simulate various electronic circuits using OrCAD and logic development using softwares like MATLAB /SCILAB.
Cognitive: Ability to **apply** previous knowledge of mathematics, engineering to write MATLAB/SCILAB programs and to perform circuit simulation using OrCAD.

Psychomotor: To handle software tools like MATLAB/SCILAB, ORCAD on computer system.
Affective: Attitude of i) Individual/team work ii) Punctuality iii) Discipline

COURSE OUTCOMES:

EIG401-1 Identify MATLAB/SCILAB environment.
EIG401-2 Develop MATLAB/SCILAB programs using inbuilt functions.
EIG401-3 Build communication models in SIMULINK using communication blockset.
EIG401-4 Identify and use OrCAD Capture, OrCAD PSpice and OrCAD Layout tools of OrCAD software.
EIG401-5 Design schematic of electronic circuits in OrCAD Capture
EIG401-6 Simulate and create PCB layout of electronic circuits in OrCAD Pspice

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, simulate various electronic circuits using OrCAD and logic development using softwares like MATLAB /SCILAB.	**2.00**	**1.34**	**2.00**	**1.00**	**-**	**-**	**-**	**2.00**	**2.00**
EIG 401-1	**-**	**1.00**	**-**	**1.00**	**-**	**-**	**-**	**-**	**-**
EIG 401-2	**2.00**	**1.00**	**2.00**	**1.00**	**-**	**-**	**-**	**2.00**	**-**
EIG 401-3	**2.00**	**2.00**	**2.00**	**1.00**	**-**	**-**	**-**	**2.00**	**2.00**
EIG 401-4	**-**	**1.00**	**-**	**1.00**	**-**	**-**	**-**	**-**	**-**
EIG 401-5	**2.00**	**1.00**	**2.00**	**1.00**	**-**	**-**	**-**	**2.00**	**-**
EIG 401-6	**2.00**	**2.00**	**2.00**	**1.00**	**-**	**-**	**-**	**2.00**	**2.00**

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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. ii) Perform different mathematical operation in MATLAB/SCILAB.	EIG401-2
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	Stimulate and verify the output of simple	EIG401-5

	OrCAD Pspice	electronic circuits designed using OrCAD tool Capture.	
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. ii) Stimulate equivalent resistance formulae. iii) Verify therotical and practical equivalence resistance values.	EIG401-4, EIG401-5
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 therotical and practical values of output	EIG401-5
24.	1st 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 allot 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
	EIG401-1 Identify MATLAB/SCILAB environment.
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.
	EIG401-2 Develop MATLAB/SCILAB programs using inbuilt functions.
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
	EIG401-3 Build communication models in SIMULINK using communication blockset
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

EIG401-4 Identify and use OrCAD Capture, OrCAD PSpice and OrCAD Layout tools of OrCAD software.	
04	**Introduction To OrCAD** 4.1 Introduction to OrCAD tools - OrCAD Capture, OrCAD PSpice, OrCAD, Layout 4.2 Features of OrCAD tools
EIG401-5 Design schematic of electronic circuits in OrCAD Capture	
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.
EIG401-6 Simulate and create PCB layout of electronic circuits in OrCAD Pspice	
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

b) Websites

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

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COURSE ID:

Course Name : 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 **	
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 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 micrcontroller
EIG402-4 Interface and Program various I/O deviceswith 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 Electronics & Telecommunication engineering in theoperation 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 & Telecommunication engineering 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 perpherals 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 ASCI 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 inputed 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	EIG402- 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 individualy 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:

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

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG402-1Classify, Define and State the functions of Embedded system			
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	**5**	**10**

	1.1.3.1 Small scale, medium scale, large scale 1.1.3.2 Sophiscated, standalone 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		
EIG402-2Apply Embedded C programming			
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**
EIG402-3 Develop timer and interrupts based applications for 8051 micrcontroller			
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^2C, 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**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
EIG402-4Interface and Program various I/O devices with 8051 microcontroller			
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**
EIG402-4Interface and Program various I/O devices with 8051 microcontroller			
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**
EIG402-5Interpret features of Real Time Operating System			
6.	**Introduction to Real Time Operating System (RTOS)** 6.1 Operating System: General and Real time 6.2 Characteristics of Real Time Operating System: Consistency, Reliability, Scalability, Performance, Predictability 6.3 Functions of RTOS:Task Management, Scheduling, Resource allocation 6.4 Features of RTOS: Watchdog Timer, semaphore 6.5 Deadlock: Reason of occuerence, 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/ Algoritm/ 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/ Algoritm/ 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

1) Simulation software:- www.keil.com
2) https://exploreembedded.com/wiki/
3) https://www.arduino.cc/
4) https://scilab-arduino.fossee.in
5) Microcontroller course available on www.nptel.ac.in
6) Real time system course videos available on www.nptel.ac.in
7) Search 'RTOS' on YouTube

* * *

COURSE ID:

Course Name : ELECTRONICS CIRCUIT DESIGN
Course Code : EIG403
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 should be able to design 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 components.
Psychomotor: Design electronic circuits for different applications.
Affective: Skills of i) Design ii) Test iii) Diagnose iv)Analyze v) Formulate

COURSE OUTCOMES:

EIG 403-1 Identify and Test various electronic components and understand their Specifications
EIG 403-2 Understand working of Rectifier and voltage regulator circuits and design them .
EIG 403-3 Design various amplifiers like CE, CC, common source amplifiers and Test them .

EIG 403-4 Understand working of Class A, Class B , Class AB power amplifier circuit and Design them .
EIG 403-5 Design and test RC and LC Oscillator circuits
EIG 403-6 Understand working of Astable , Monostable and Bistable Multivibrator and and Analyse its performance parameters

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					-	-	-		
EIG 403-1	2	2	3	3	-	-	3	3	3
EIG 403-2	3	3	3	3	-	-	1	3	3
EIG 403-3	3	3	3	3	-	-	1	3	3
EIG 403-4	1	2	3	3	-	-	1	2	2
EIG 403-5	1	3	3	3	-	-	1	3	2
EIG 403-6	3	3	3	3	-	-	1	3	2

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering in the operation and maintenance of engineering application systems.
PSO 2: Supervision and providing solution: Ability to supervise work and reach appropriate solution to simplify practical problems in Electronics & Telecommunication 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 'X' experiments).

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

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 individualy 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 a bulgar 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

B) THEORY

SECTION I

Sr. No.	TOPIC/ SUB TOPIC	Teaching (Hours)	Theory evaluation Marks
	EIG 403 -1 Identify and test various components and understand specifications		
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(wrt Hybrid parameters of Transistor) 1.5 Field Effect Transistor 1.6 Unipolar Junction Transistor	04	08
	EIG 403 -2 Design rectifier circuits		
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 723 low and high voltage regulator 2.6 Design of Three terminal regulator IC-78xx and 79xx. (NUMERICAL BASED ON ABOVE TOPIC)	10	16

	EIG 403 - 3 Design small signal amplifier		
3	**Design of small signal amplifier.** 3.1Design of small signal voltage amplifier (CE) a. Design of Emitter follower, Bootstrapped Emitter follower. b. Types of coupling in multistage amplifiers-Direct Coupling and RC coupling c. Design of two stage R-C coupled amplifier d. Design of Common-source amplifier **e.** Design of source follower. (NUMERICAL BASED ON ABOVE TOPIC)	10	16
	TOTAL:	**24**	**40**

SECTION II

	EIG 403 - 4 Design power amplifier circuits		
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
	EIG 403 - 5 Design electronic oscillator circuits		
5	**Design of Oscillators** 5.1 Barkhahusen's Criteria 5.2 Design of R-C phase shift oscillator using BJT and Op-amp 5.3 Design of Wien bridge oscillator using BJT and Op-amp 5.4 Design of Colpitt's oscillators using BJT and Op-amp 5.3 Design of Hartley oscillator using BJT and Op-amp	10	16
	EIG 403 -6 design astable , monostable and bistable circuits		

06	**Design of Multivibrators** 6.1 Design of Astable multivibrator using IC 555 and Op-amp 6.2 Design of Monostable multivibrator 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

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/Algoritm/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.*

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	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.*

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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

1) www.electroschematics.com
2) www.discovercircuits.com
3) www.allaboutcircuits.com
4) www.learningcircuits.co.uk

* * *

COURSE ID:

Course Name : PROJECT 1

Course Code : EIG404

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 application

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	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	-	-	-	-

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

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) vu1. 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 students 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	2.1Information gathering through websites and media. 2.2Identification 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 on	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	10
	Project diary ,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 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 5th semester	10
	Seminar Report and documentation	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:

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

3) www.datasheet.com
4) http://www.electronicshub.org
5) http://www.engineersgarrage.org
6) http://www.electronics-project-design.com
7) http://www.eleccircuit.com
8) http://www.circuit-projects.com
9) http://www.electronicsproject.org
10) http://www.circuiteasy.com
11) http://www.electronics-project-design.com
12) http://www.electronicsschematic.com

c) Magazines:

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

***

F16: Project 1 and 2 Weekly Progress Report

GOVERNMENT POLYTECHNIC, KOLHAPUR

Department: _____

Final Year Project Work: Weekly Progress Report

Semester: I/II	**Week No:**	**Date:**
Objective		
Problem		
Solution/Discussion		
Next Week Task		

Detailed Planning of Project Work :

SN	Activity	Details	Date of completion
	Finalization of students' groups and assignment of project guide (Performa P-2)	Policy to be decided by Programme department	
	Identification and finalization of topic (Performa P-1)	• Review of previous projects • Brain storming session for project ideas • Internet search for topic • Industry / field problem search	
	Preparation and presentation of project synopsis including project completion plan (Performa P-3)	• 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	
	Demonstration-1 (term-1 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
	Preparation of seminar report and Presentation of work done till the end of 5th semester with PowerPoint presentation(seminar) (Performa P-6 & P-5)	• Submission of seminar project report with conclusion of project • PowerPoint presentation • Assessment as per prescribed rubrics	
	Demonstration-2 (mid-term-2 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
	Preparation of final year project report and presentation of working model of project with PowerPoint presentation (Performa P-6 & P-5)	• Submission of final project report with conclusion of project • PowerPoint presentation • Assessment as per prescribed rubrics	
	Final examination	As per curriculum specifications	

F17: Project Sheet "Proforma P1"

Proforma P1

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 Discipline 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
1…..									
2…..									
3…..									

Details of Students' Group : Project Batch - ……

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

F18: Finalization of Project Groups, Topics and Guides "Proforma P2"

Proforma P2

FINALIZATION OF PROJECT GROUPS, TOPICS AND GUIDES

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

Date :

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

F19: Project 1 and 2 Individual and team performance "Proforma P3"

Proforma P3
ASSESSMENT RUBRICS FOR SYNOPSIS OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total *(Out Of 25)*
		Feasibility Study (5)	Objective and Scope (5)	Block diagram/Design and description (5)	Methodology/ Planning of work (5)	Expected outcomes/ result, References (5)	

Signature of Project Guide

F20: Project 1 and 2 Individual and team performance "Proforma P4"

Proforma P4

ASSESSMENT RUBRICS FOR DEMONSTRATION-1/2 OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total Out of 50
		Content		Delivery			
		Conceptual Understanding (10)	Relevance & Accuracy (10)	Organization, preparation and effectiveness of delivery (10)	Style, pacing and body language (10)	Time management and Q & A (10)	

Signature of Project Guide

F21: Project 1 and 2 Individual and team performance "Proforma P5"

Proforma P5

ASSESSMENT RUBRICS FOR SEMINAR REPORT OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total (Out Of 25)
		Objective and Scope (5)	Literature Review (3)	Methodology (10)	Conclusion/ References (2)	Report format/ Writing Skill (5)	

Signature of Project Guide

F22: Project 1 and 2 Individual and team performance "Proforma P6"

Proforma P6
ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total Out of 50
		Content		Delivery			
		Conceptual Understanding (10)	Relevance & Accuracy (10)	Organization, preparation and effectiveness of delivery (10)	Style, pacing and body language (10)	Time managementt and Q & A (10)	

Signature of Project Guide

COURSE ID:

Course Name : **DATA COMMUNICATION AND NETWORKING**
Course Code : **ETG405**
Course Abbreviation : **GDCN**

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	Oral* & 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 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:

Communication plays 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 digital communication skillfully. The primary purpose of this course is to give an elementary but sound fundamental understanding of how data communication work, its basic components, how they work and basic knowledge of applications of Internet. After understanding basic communication system it is worth to discuss Data Communication & Networking. Telecommunication & Data communication is the fastest growing technology & undoubtedly has strong growth in future hence students should know data transfer from one system to another through different communication networks like WAN, MAN & different switching techniques.

COMPETENCY:

Implement different protocols used for data communication using various switching techniques and network topologies.
Cognitive: Understanding network topologies, and protocols used in various switching approaches and wireless technologies.

Psychomotor: Implement star and tree topologies using computers and simple protocols in C for wide range of applications.
Affective: Attitude of i) Logic ii) accuracy iii) speed of data communication v) punctuality

COURSE OUTCOMES:

ETG405-1 Explain the concepts of data communication

ETG405-2 Identify different topologies and illustrate its functioning based on connecting devices

ETG405-3 Identify different switching techniques and explore their applications

ETG405-4 Identify and correct digital transmission errors and Illustrate Protocols for Noiseless and Noisy Channels

ETG405-5 Classify wireless LAN protocols and describe network security solutions

ETG405-6 Summarize application layer protocols and describe its formats

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: implement different protocols used for data communication using various switching techniques and network topologies.	2	-	-	2	2	-	1	-	1
ETG405-1	2	-	-	-	-	-	1	-	1
ETG405-2	2	-	-	-	-	-	1	-	1
ETG405-3	2	-	-	-	-	-	1	-	1
ETG405-4	2	-	-	1	-	-	-	1	1
ETG405-5	2	2	1	1	1	1	1	--	1
ETG405-6	2	1	1	1	1	1	1	--	1

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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.	Survey of any existing data communication system	• Understanding data communication system • Working and use of the data communication system • Efficiency of the system in handling transmission impairments	ETG405-1
2.	Compare different network topologies	• Definition of topology. • To understand different types of topologies i.e LAN, MAN, WAN.	ETG405-2
3.	Compare different transmission medias	• Study different transmission media and identify differences between them	ETG405-2
4.	Layout of lab network	• To study and draw type of topology used for computer lab networking	ETG405-2
5.	Router, Repeater and bridge	• Install and test Router, Repeater and bridge	ETG405-2
6.	Interconnect two PCs	• Interconnect two PCs using RS232 cable and transfer data as null modem configuration	ETG405-2
7.	Peer to Peer Network Implementation	• Understand installation of NIC Driver and assign IP address, name to node and share resources like Drives, Folder	ETG405-3
8.	Flow Control using Wireshark	• Use wireshark open source network troubleshooting software for flow control	ETG405-4
9.	Error Control using Wireshark	• Use wireshark open source network troubleshooting software for error control	ETG405-4
10.	Program for error detection using C	• Implement a C program for error detection	ETG405-4
11.	Program for Error correction using C	• Implement a C program for error correction	ETG405-4
12.	Create connection to available wireless network	• Implement the steps to create connection with wireless network	ETG405-5
13.	Firewalls	• Install and configure firewall for network security	ETG405-5
14.	Packet sniffing tool	• Install and study use any Packet sniffing tool	ETG405-5
15.	Files sharing	• To understand step by step procedure used for files sharing.	ETG405-6

16.	Use FTP Protocol to transfer file from one system to another system	• To understand step by step procedure used for files sharing using FTP protocol	ETG405-6
17.	Configure static and dynamic IP addresses	• Configure static and dynamic IP addresses step by step	ETG405-6
18.	Access rights and security permission	• Set Access rights and security permission for user	ETG405-6
19.	Troubleshooting using TCP/IP	• Understand and implement various TCP/IP utilities	ETG405-6
20.	Configure/Test internet connectivity	• Configure/Test internet connectivity	ETG405-6

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) Prepare a proposal to develop a network system that links two branch offices of an organization .The two branches are separated by a distance of 10km.Make appropriate assumption while preparing the proposal
b) Survey of different wireless networking devices
c) Prepare report on widely used unguided media in industries depending on cost, efficiency, speed, reliability etc.
d)Design Layout of a Network for department, depending upon type of network number/length of components with their specification.
e) Prepare a detail report on application of Computer Network in a Mall/railway reservation system
f)Visit a CISCO based laboratory /any other networking laboratory and prepare a report of the various networking equipment's and networking facility
g) Prepare a hardware specification required to develop a wireless LAN for cyber-café of 20 users

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
ETG405-1: Explain the concepts of data communication			
1	**Concept of Data Communication** 1.1. Data Communication – components, data representation 1.2. Data flow - Simplex, half-duplex & full-duplex 1.3. Protocols; Standards; Standards Organizations; 1.4. Periodic analog signal : wavelength, time and frequency domain, composite signals, bandwidth 1.5. Digital signals – bit rate, bit length, digital signal as composite analog signal 1.6. Digital signal transmission – base band transmission, broadband transmission 1.7. Transmission impairment – attenuation, distortion, noise 1.8. Data rate limits – noiseless channel (Nyquist bit rate), Noisy channel (Shannon capacity) 1.9. Performance of network – Bandwidth, Throughput, 1.10. Latency (Delay), Transmission time, Bandwidth delay product, Jitter	**08**	**12**
ETG405-2:Identify different topologies and illustrate its functioning based on connecting devices			
2	**Introduction To Networking** 2.1.Network definition & criteria (performance, reliability, security) 2.2.Type of connection - Point to point, multipoint Network topology: Mesh, ring, bus, star, hybrid 2.3.Types Of Networks :LAN,WAN and MAN, Internet and internet service providers 2.4.Network models – OSI, TCP/IP(Organization and Functions Of each layer) 2.5.Levels (Types) of addressing – Physical, Logical (IP), Port, and Specific addresses 2.6.Transmission media and types – performance, advantages and applications, 2.7.Modems –block schematic & standards Network Devices: Network Connectors, Hubs, Switches, Routers, Bridges	**08**	**14**

ETG405-3: Identify different switching techniques and explore their applications			
3	**Switching Techniques** 3.1.Connection oriented services (Virtual circuits) and Connectionless services (Datagrams) 3.2.Switching Basics - Circuit Switching; Packet Switching - Datagram approach, Virtual circuit approach; Message Switching 3.3.Frame Relay - Introduction; The need for Frame Relay 3.4.How Frame Relay works; Frame Relay frame format 3.5.Asynchronous Transfer Mode (ATM) – Introduction, Overview of ATM	**08**	**14**
Sub-total		**24**	**40**

SECTION II

Sr. No.	**Topics**	**Teaching hours**	**Marks**
ETG405-4 :***Identify and correct digital transmission errors and Illustrate Protocols for Noiseless and Noisy Channels***			
4.	**Error detection & correction :** 4.1. Types of errors. 4.2.Redundancy 4.3.Detection VS Correction 4.4Error Detection method – CRC encoder and decoder 4.5Data Link Control & Protocol – Framing, Flow & Error Control, 4.6Noiseless and noisy channels, Simple, Stop-N- Wait Protocol 4.7 Stop-N-Wait ARQ Protocol 4.8 Go Back N ARQ, Selective Repeat ARQ, Piggybacking	**10**	**14**
ETG405-5: Classify wireless LAN protocols and describe network security solutions			
5	**Wireless LAN and Network security** 5.1. IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet 5.2.Wireless LAN systems 5.3.IEEE 802.11n - Architecture- BSS, ESS; 5.4.Physical layer : FHSS, DSSS, OFDM; 5.5.MAC layer – DCF, PCF 5.6.Cryptography: Need, Encryption model	**06**	**12**

ETG405-6:Summarize application layer protocols and describe its formats			
6.	**Applications Layer** 6.1Domain Name System (DNS) 6.1.1. Label, Domain name, Domain, Zone. 6.1.2. Root Server, Primary Server, Secondary Server, Zone transfer. 6.2.Email -Simple Mail Transfer Protocol (SMTP); 6.3.Multipurpose Internet Mail Extension (MIME); 6.4.POP 6.5.IMAP 6.6Hyper Text Transfer Protocol(HTTP); 6.7TELNET 6.8File Transfer Protocol (FTP) 6.9.World wide web(www) 6.10.Uniform Resource Locator (URL) 6.11.IP version 4 6.12.Simple Network Management Protocol(SNMP) 6.12.1 Introduction. 6.12.2 Block Diagram.	**08**	**14**
	Sub total	**24**	**40**
	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	Application		
1	Concept of Data Communication	02	04	06	ETG405-1	12
2	Introduction To Networking	04	04	06	ETG405-2	14
3	Switching Techniques	04	04	06	ETG405-3	14
4	Error detection &correction	04	04	06	ETG405-4	14
5	Wireless LAN and Network security	02	04	06	ETG405-5	12
6	Applications Layer	04	04	06	ETG405-6	14
	Total >>	**20**	**24**	**36**		**80**

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

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 II.*

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 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	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 II.*

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.	Achyut S. Godbole	Data Communication & Networking	Tata McGraw-Hill Edition
2.	B.A. Forouzan	Data Communication & Networking	Tata McGraw-Hill Edition(4th Edition)
3.	Michal Miller	Data & Network Communication	Thomson Delmar Learning

b) Websites

1) www.nptel.ac.in
2) www.tutorialspoint.com/data_communication_computer_network.
3) freevideolectures.com › Networking › IIT Kharagpur
4) www.concise-courses.com/security/wireshark-basics/

* * *

COURSE ID:

Course Name : PRINCIPLES OF CONTROL SYSTEM
Course Code : EIG406
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 Analyze transient and steady state responses of system.
EIG 406-3 Construct frequency response of system using Bode plot
EIG 406-4 Use different stability conditions of control system.

EIG 406-5 Identify use of servo motors as per requirement.
EIG 406-6 Apply appropriate Control actions & process controllers in Industry.

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

Competency and Cos	Programme Outcomes POs and PSOs								
	PO 1 Basic 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.	1	-	-	1	-	-	-	-	2
EIF404-1.Identify various types of control systems	1	-	-	1	-	-	-	-	2
EIF404-2 Analyze transient and steady state responses of system	1	-	-	1	-	-	-	-	2
EIF404-3. Construct frequency response of system using Bode plot	1	1	-	1	-	-	-	-	2
EIF404-4 Use different stability conditions of control system.	1	1	-	-	-	-	-	-	2
EIF404-5.Identify use of servo motors as per requirement.	1	-	-	1	-	-	-	-	2
EIF404-6: Apply appropriate Control actions & process controllers. .	1	-	-	1	-	-	-	-	2

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

CONTENT:

A) SUGGESTED PRACTICAL'S/ EXERCISE

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. 3. Plot the graph of on-off controller.	EIF 406-6
8.	Temperature controller with PI controller	1. Analyze temperature controller with PI controller. 2. Observe output for various set points. 3. Plot the graph of PI controller.	EIF 406-6
9.	Temperature controller with PID controller.	1.Analyze temperature controller with PID controller 2. Observe output for various set points. 3. Plot the graph of PID controller.	EIF 406-6
10.	Temperature controller with PD controller	1. Analyze temperature controller with PD controller. 2. Observe output for various set points 3. Plot graph of PD Controller.	EIF 406-6
11.	Bode Plot	1. Understand procedure to draw bode plot. 2. Using Matlab software, sketch bode plot on given problem. 3. Verify theoretical and practical values for parameter such as GM,PM.	EIF 406-3

12	Root Locus	1. Understand procedure to draw root locus. 2. Using Matlab software, sketch root locus on given problem. 3. Verify theoretical and practical values for parameter such angle of asymptotes and centroid.	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 software	1. Build second order RLC Circuit using Matlab software 2. Observe the output for step input	EIF 406-2
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 3. Using Matlab software, observe the graph of on-off controller.	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 individualy 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 a chart of block diagram reduction rules.
b) Prepare a power point presentation of Routh's stability criteria and present it in classroom.
c) Build and test step response of RC circuit in matlab.
d) Build and test step response of RLC circuit in matlab.
e) Construct and test potentiometer as an error detector.
f) Draw root locus for a given system's transfer function and explain it in classroom.
g) Draw Bode Plot for a given system's transfer function and explain it in classroom.
h) Build and test PI controller in matlab.
i) Build and test PD controller in matlab.
j) 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	**10**	**14**

	diagram, practical example & Comparison 1.4 Laplace transform – Significance in control system 1.5 Transfer function – definition, derivation of transfer function for close loop control system. 1.6 Order of a system – definition, 0^{th}, 1^{st} ,2^{nd}order system standard equation, practical examples. 1.7 Linear time varying and time in varying systems –definition and example 1.8 Developing differential equations of R-C and RLC electric circuits-simple numerical for finding transfer function of electrical network 1.9 Block diagram representation of a system- need, reduction rules, numericalsassociated with it (only SISO).		
EIG 406-2 :Predict transient and steady state responses of system.			
2.	**Time Domain Analysis** 2.1 Time domain and frequency domain analysis-definition 2.2 Transient and steady state response, steady state error-definition and equation only. 2.3 Standard test inputs - step, ramp, parabolic& impulse. Need of them, significance, and corresponding Laplace representation 2.4 Poles, zeros & characteristics equation – definition 2.5 Types of feedback control system: type 0 system, type1 system andtype2 system-only definition 2.6 Analysis of first order control system for unit step input. 2.7 Analysis of second order control system for unit step input. 2.8 Time response specifications –Definitions and equations (no derivations) Numericals on Poles,zeros,characteristic equation and time response specification	**06**	**14**

EIF 406-3: Draw frequency response of system using bode plot.			
3	**Frequency domain Analysis** 3.1 Introduction, advantages & disadvantages of frequency response analysis 3.2 Frequency response specifications-definitions 3.3 Correlation between time and frequency domain specifications, 3.4 Bode plot-introduction, 3.4.1. General procedure for constructing Bode plot 3.4.2 Plotting gain margin & phase margin 3.4.3 Simple numerical (max. up to 2-poles)	**08**	**12**
	Sub Total	**24**	**40**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
EIG 406-3: Draw frequency response of system using bode plot.			
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**
EIG 406-5: Identify use of servo motors as per requirement.			
5	**Servo Systems** 5.1 Servo system –definition, block diagram, 5.2 AC & DC servo systems- 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**
EIG 406-6: Select appropriate Control system processes as necessary.			
6.	**Control actions & process controllers** 6.1 Process control system – block diagram , elements	**07**	**12**

	6.2 Control actions: discontinuous & continuous modes 6.3 On off controllers: neutral zone 6.4Concepts of Proportional controllers (offset, proportional band) Integral controllers & Derivative controllers 6.5Composite controllers:PI, PD, PID controllers 6.6All Control actions of electronic controllers with circuits & equations (with op amp)		
	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	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 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

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram/ Algoritm/ 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**

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	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

1) www.nptel.ac.in
2) www.electronics-tutorials.ws
3) http://electrical4u.com/controlsystem
4) https://www.youtube.com/watch?v=XMfH2P2Fc6Q
5) https://www.youtube.com/watch?v=NUUGOgkOd1A
6) https://www.oreilly.com/library/view/feedback-control-for/9781449362638/ch04.html
7) https://www.mathworks.com/company/newsletters/articles/6-steps-to-an-on-off-controller-using-stateflow.html

* * *

COURSE ID:

Course Name : SIGNALS AND SYSTEMS

Course Code : ETG407

Course Abbreviation : GSAS

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 of Term End Practical exam will be done as per Pro-forma IV

RATIONALE:

In Signals and Systems a signal is a description of how one parameter varies with another parameter. For instance, voltage changing over time in an electronic circuit, or brightness varying with distance in an image. A system is any process that produces an output signal in response to an input signal. Examples of systems that manipulate signals are speech recognition, video streaming, cellular networks and medical scans such as MRI. The disciplines of signal and image processing are concerned with the analysis and synthesis of signals and their interaction with systems.

COMPETENCY:

Understand and Analyze different types signals and system to solve engineering problems.

Cognitive: Ability to **apply** previous knowledge of mathematics, science, engineering to solve engineering problems
Psychomotor: To implement, perform and verify signals systems and transforms on MATLAB software.
Affective: Attitude of i) Individual/team work ii) Punctuality iii) Discipline

COURSE OUTCOMES:

ETG407-1 Classify signals and identify of ODD and even part of signals
ETG407-2 Analyze operations on signals such as shifting, reversal, scaling etc
ETG407-3 Identify and classify types of the systems
ETG407-4 Describe Linear time invariant systems using mathematical models and discuss their properties
ETG407-5 Explain Fourier series and its properties
ETG407-6 Explain **Fourier** – Transform properties and analyse signal and system using Z 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 **]**

Competency and Cos	Program 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 and Analyze different types signals and system to solve engineering problems	2	2	1	2	-	-	-	1	1
ETG407-1	2	2	1	1	-	-	-	-	-
ETG407-2	2	2	2	2	-	-	-	-	1
ETG407-3	1	2	1	2	-	-	-	1	1
ETG407-4	2	2	2	2	-	-	-	1	1
ETG407-5	2	1	1	1	-	-	-	-	-
ETG407-6	2	2	1	2	-	-	-	-	-

- **PSO 1. Operate and Maintain:** Competency to apply the concepts of Electronics & Telecommunication engineering 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 and Telecommunication engineering industry.

CONTENTS:

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 10/15 out of 20/25 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	a) Introduction of MATLAB environment b) Basic operations on matrices such as addition, subtraction, multiplication, division	To Learn MATLAB, Programming	ETG 407-1
2.	Generation of various Continuous time signals and seque nce using MATLAB inbuilt function such as, Sinusoidal signal, Unit-step signal, Ramp signal, Tria-ngul ar function, Exponential signal, Impulse signal,	Programming, Analysis	ETG 407-1
3.	Write a Program for sampling of continuous time sig-nal.	Programming, Analysis	ETG 407-2
4.	Generation of various Discrete time signals and sequ-ence using MATLAB inbuilt function such as, Sinusoidal signal, Unit-step signal, Ramp signal, Tria-ngul ar function, Exponential signal, Impulse signal	Programming, Analysis	ETG 407-1
5.	Operation on signals and sequences (a) WAP to plot graph of addition of 2 signals (b) WAP to plot graph of Multiplication of 2 signals	Programming, Analysis	ETG 407-2
6.	Operation on signals and sequences (a) WAP to plot time shifting of Discrete Time Signal (b) WAP to plot time scaling of Discrete Time Signal (c) WAP to plot time reversal of Discrete Time Signal	Programming, Analysis	ETG 407-2
7.	Write a MATLAB program to find the impulse response an d step response of a system from its difference equation. Compute and plot the response of a given system to a given input.	Programming, Analysis	ETG 407-3
8.	Checking linearity/non-linearity of a system using MATLAB	Programming, Analysis	ETG 407-3
9.	Checking causality/non- causality of a system using MATL AB	Programming, Analysis	ETG 407-3
10.	WAP for convolution of two DT sequences.	Programming, Analysis	ETG 407-4
11.	WAP for cross-correlation of two DT sequences.	Programming, Analysis	ETG 407-4
12.	Program for auto-correlation of two DT sequences	Programming, Analysis	ETG 407-4
13.	Write a MATLAB program to generate Fourier series of a Square Wave	Programming, Analysis	ETG 407-5
14.	WAP to find the Fourier Transform of a given signal and p lot its magnitude and phase spectrum	Programming, Analysis	ETG 407-6
15.	To locating the zeros and poles and plotting the pole zero maps in s-plane and Z-plane for the given transfer function	Programming, Analysis	ETG 407-6

A.2 Micro-project

Each student should allot 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) Microproject 1 title:- Generation of different Waveforms using MATLAB.

b) Microproject 2 title:- Verification of pole zero analysis using transfer function, pole zero gain.
c) Microproject 3 title:- Write a MATLAB program to generate Fourier series of different waveforms.
d) Microproject 4 title:- Basic plotting of signals: To study various MATLAB commands for creating two- and three-dimensional plots.
e) Microproject 5 title:- Write a MATLAB program to plot magnitude and phase response of a given system
f) Microproject 6 title:- Checking linearity/non-linearity of a system using SIMULINK Build a system that amplifies a sine wave by a factor of two.

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
ETG407-1. Classify signals and identify of ODD and even part of signals			
1	**Introduction to signals** 1.1 A Signal: Definition 1.2 **Standard Test signals** Unit Step function, Unit Impulse function, Ramp signal, Parab olic signal, Exponential signal, Sinusoidal signal, Triangular Si gnal, Rectangular pulse Signal 1.3 **Classification of signals** 1.3.1 Multichannel and Multidimensional signals 1.3.2 Continuous time Vs discrete time signals 1.3.3 Deterministic Vs random signals 1.3.4 Periodic Vs aperiodic signals 1.3.5 Symmetric (Even) Vs Asymmetric (Odd) signals 1.3.6 Energy and Power signals Comparison of Energy and Power signals (Numerical based on Odd and Even signals)	**04**	**08**
ETG407-2. Analyze operations on signals such as shifting, reversal, scaling etc			
2	**Basic Operations on Signals** **2.1 Basic operations on Continuous time Signals** Time Shifting, Time Reversal, Time Scaling, Amplitude scaling, Signal addition, Signal multiplication **2.2 Sampling of CT signal** **2.3 Basic operations on Discrete time Signals** Time Shifting, Time Reversal, Time Scaling, Amplitude scaling, Signal addition, Signal multiplication (Numericals based on signal operations)	**10**	**16**
ETG407- 3 Identify and classify types of the systems			
3	**Introduction to Systems** **3.1 A System:** Definition, Block diagram representation of Discrete time systems with blocks adder, a constant multiplier, a signal multiplier, a unit delay element, a unit advance element. **3.2 Classification of systems**	**10**	**16**

	3.2.1 Continuous time systems and discrete time systems 3.2.2 Static and dynamic systems 3.2.3 Causal and Noncausal System 3.2.4 Linear and Nonlinear system 3.2.5 Time invariant and time variant system 3.2.6 Stable and unstable system (Numerical based on identification of systems)		

SECTION II

Sr. No.	Topics	Lecture (Hours)	Marks
ETG407- 4 Describe Linear time invariant systems using mathematical models and discuss their properties			
4	**Linear time Invariant system and convolution** 4.1 Linear time Invariant system 4.2 Convolution using graphical method 4.2.1 Convolution sum of two continuous time sequences 4.2.2 Convolution sum of two discrete time sequences 4.3 Tabular method for convolution of two discrete time sequences 4.4 Properties of discrete convolution 4.5 Concept of Correlation 4.6 Types of correlation 4.6.1 Cross correlation 4.6.2 Auto correlation 4.7 Applications of correlation (Numericals based on Convolution sum using graphical method, tabular method, auto correlation and cross correlation)	**10**	**16**
ETG407-5 Explain Fourier series and its properties			
5	**Fourier Series for Continuous & Discreate Time** **5.1** Development of **Fourier Series derivation** 5.2 Properties of **Fourier Series** 5.2.1 Linearity, Time shifting, Frequency shifting, Ti-me reversal, Time scaling, Multiplication, Convolution	**04**	**08**
ETG407-6 Explain Fourier – Transform properties and analyse signal and system using Z Transform			
6	**Continuous Time & Discreate Time Fourier Transform** 6.1 Basic concept of **Fourier Transform of functions: rectangular signal, Impulse signal** 6.2 Properties of **Fourier Transform** Linearity, Time shifting, Frequency shifting, Time scaling, Multiplication, Convolution **6.3 Introduction of Z-transform** 6.4 Relation between Z transform and Fourier Transform 6.5 ROC (Region of Convergence) 6.5 Pole-zero plot	**10**	**16**

	(Simple Numericals on Z transform and Sketch ROC)		
	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	To Classify signals and ill ustrate of ODD and even part of signals	2	2	4	ETG407-1	**08**
2	Analyze operations on sign als such as shifting, revers al, scaling etc	4	4	8	ETG407-2	**16**
3	Identify and classify types of the systems	4	4	8	ETG407-3	**16**
4	Describe Linear time in variant systems using math ematical models and dis cuss their properties	4	4	8	ETG407-4	**16**
5	Explain Fourier series an d its properties	2	2	4	ETG407-5	**08**
6	Transform properties and analyse signal and system using Z Transform	4	4	8	ETG407-6	**16**
	Total >>	**20**	**20**	**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 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/ Algoritm/ 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 and discussions
2. Assignments
3. Laboratory work
4. NPTEL/Swayam course lectures

Teaching and Learning Resources:

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

REFERENCE MATERIAL:

a) Reference Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1	Ramesh Babu	'Signals & system'	SciTech Publication
2	H. A HSU	'Signals & System' (Schaum's out lines)	Tata McGraw Hill
3	Shah & Bhagli	'Signal & System'	Mahalaxmi Publication
4	Simon Haykin, Barry Van Veen-	'Signals & System'	IInd Edition Wiley publication
5	Anand kumar	'Signals & System'	PHI Publications

b) Websites

1) https://nptel.ac.in/courses/117101055
https://youtu.be/0nZYen9w_eo

***

COURSE ID:

Course Name : SATELLITE COMMUNIATION

Course Code : ETG408

Course Abbreviation : GSAT

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:

In the context of worldwide communication network, satellite communication systems are very important. Satellite communication links add capacity to existing communication capabilities and provide additional alternate routings for communication traffic. They have unique advantage over conventional long distance transmission. It is unaffected by propagation variation that interfere with hf radio.

COMPETENCY:

Pertain knowledge of satellite types, orbits and applications and maintain satellite communication

Cognitive: Construct basic understanding of satellite communication techniques.
Psychomotor: Characterize basic idea related to satellites.
Affective: Attitude of I) self-awareness ii) chastity iii) intuitive mind v) decision making

COURSE OUTCOMES:

EIG408-1 Recognize the fundamentals of satellite communication and list different parts and specify various orbits for satellite
EIG408-2 Describe satellite signal stability by defining azimuth and elevation angle and tell various bands used for satellite communication.
EIG408-3 Recognize uplink and downlink modules and discuss functions of its various parts.
EIG408-4 Describe various multiple access approaches to satellite communication and discuss downlink analysis
EIG408-5 Identify different sub-systems of satellite communication and explain their roles.

EIG408-6 Illustrate different services offered by satellite communication in data and voice communication.

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
CompetencyPertain basic knowledge about satellite types, orbits and applications	1	2	1	1	-	-	-	-	2
EIG408-1	2	1	1	-	-	-	-	-	2
EIG408-2	1	3	2	-	-	-	-	2	2
EIG408-3	2	2	1	-	-	-	-	-	-
EIG408-4	1	2	-	-	-	-	-	-	-
EIG408-5	1	2	-	-	2	-	-	-	2
EIG4086	2	2	2	-	2	-	-	-	2

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 out of 12 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	To study concepts of Satellite Communication	Understanding different parts and types of Satellite Communication	ETG408 -1
2.	To set up Direct link	Understanding different frequency such as uplink & downlink frequency.	ETG408 -2
3.	To set up Active Satellite link	Understanding concept of active satellite link.	ETG408 -2
4.	Study Satellite transponder	Understanding function of satellite transponder.	ETG408 -2
5.	To set up Satellite communication link	Understanding concept of Satellite communication link	ETG408 -3
6.	Study Audio-Video transmission through Satellite link	Transmission of audio – video data through satellite link	ETG408 -3
7.	To transmit and receive function generator waveforms through Satellite link	Understanding the way how function generator waveform can be transfer & receive through satellite link.	ETG408 -6
8.	To establish PC-to-PC communication Using satellite communication link	Established the communication link Between PC toPC	ETG408 -6
9	Setting up an active satellite link and demonstrate link fail Operations	Understanding the way that can be transfer & receive through satellite link.	ETG408 -6
10	Esteblish a link to transmit and receive three separate signals (Audio, video, tone) simultaneously through satellite link.	Understanding the way how (Audio, video, tone), can be transfer & receive through satellite link.	ETG408 -6
11	Track the dish antenna of DTH system to get the good quality signal reception.	Understanding the function DTH Traking for receive the signal from satellite link.	ETG408 -5
12	Install DTH system to get the free DTH signal.	Understanding the function of DTH instalation.	ETG408 -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 individualy 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 an internet based report on different types of lanching vehicals used for satellite lanching.
h) Prepare the chart to indicate aplications of various satellite frequency bands (L, S, X, Ku and Ka band)
i) Prepare a survey report on the different types of antennas used for satellite communication.
j) Conduct an internate survey and prepare a detail report on GPS and its applications

B) THEORY:

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG408-1 Recognize the fundamentals of satellite communication and list different parts and specify various orbits for satellite			
1	**Fundamentals of Satellite communication** 1.1 Classification of satellite – synchronous, asynchronous, active, passive. 1.2 Kepler's law. 1.3 Satellite orbit and their operating frequencies-low earth orbit, Medium earth orbit, geosynchronous orbit. 1.4 Satellite orbital terms- apogee, perigee, major axis, minor axes. 1.5 Functions Of transponder, payload (bus), and ground station.	**6**	**10**
EIG408-2 Describe satellite signal stability by defining azimuth and elevation angle and tell various bands used for satellite communication.			
2	**Satellite angles , controls and stabilization** 2.1 Sub satellite point. 2.2 Look angles- angle of elevation, azimuth angle. 2.3 Angle of inclination. 2.4 Different frequency band used in satellite and their uplink, downlink frequency C band, X band, Ku band, Ka band. 2.5 Terms used in Satellite - footprint, orbital drift, attitude control, propulsion control, eclipse effect, (E-W) station keeping, (S-N) station keeping. 2.6 Satellite stabilization- spins stabilization, three axis Stabilization. 2.7 Placement of satellite in geostationary orbit.	**8**	**16**
EIG408-3 Recognize uplink and downlink modules and discuss functions of its various parts.			
3	Satellite System model 3.1 Block diagram of uplink model. 3.2 Block diagram of transponder. 3.3 Block diagram of down link model. 3.4 Block diagram of satellite sub system showing	**10**	**14**

	telemetry controls main rocket, auxiliary rocket, generation of power, transponders. 3.5 Block diagram of telemetry tracking unit. 3.6 Application and advantage of satellite communication		
	Sub-total	**24**	**40**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
EIG408-4 Recognise various multiple access approaches to satellite communication and discuss downlink analysis			
4.	Interference and Satellite access 4.1 Introduction 4.2 Interference between satellite circuits 4.3 Satellite access 4.4 Single access 4.5 Preassigned FDMA, SCPC (spade system), TDMA, pre-assigned TDMA, demand assigned TDMA, down link analysis 4.6 Comparison of uplink power requirements for TDMA & FDMA	**10**	**14**
EIG408-5 Identify different sub-systems of satellite communication and explain their roles.			
5	**Space segment** 5.1Introduction 5.2 Power supply units 5.3 Altitude control 5.4 Station keeping 5.5 Thermal control 5.6 TT&C, transponders 5.7 Antenna subsystem.	**08**	**14**
EIG408-6 Illustrate different services offered by satellite communication in data and voice communication.			
6.	**Satellite Services** 6.1 Packet satellite networks and services 6.2 fixed satellite services 6.3 broadcast satellite services 6.4 mobile satellite services- VSAT 6.5 global positioning satellite system 6.6 Maritime satellite services 6.6 gateways, ATM over satellite 6.7 role of satellite in future network.	**06**	**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	Fundamentals of Satellite communication	04	00	04	ETF 408-1	08
2	Satellite angles , controls and stabilization	06	04	06	ETF 408-2	16
3	Satellite System model	06	04	04	ETF 408-3	14
4	Interference and Satellite access	06	06	04	ETF 408-4	16
5	Space Segment	04	06	04	ETF 408-5	14
6	Satellite Services	04	04	04	ETF 408-6	12
	Total >>	**30**	**24**	**26**		**80**

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

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 X.*

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 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.	Frenzel	Communication electronics	McGraw Hill international
2.	K.R.Botkar	Dr D. C Agarwal	Khanna Publications
3	Wayne Tomasi	Electronic communication	Tata McGraw-Hill
4	George Kennedy	Electronic communication system	Tata McGraw-Hill

b) Websites

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

* * *

LEVEL- V
MANAGEMENT AND DIVERSIFIED TECHNOLOGY 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 Operate and Maintain**	**PSO2 Supervision and Providing Solution**
Competency: The aim of this course is help the students to attain tha following industry identified competency	--	2	3	2	3	3	2	3	3
CCG501-1	--	2	--	--	2	--	1	--	--
CCG501-2	--	2	--	--	2	--	1	--	--
CCG501-3	--	2	2	1	--	2	2	--	2
CCG501-4	--	--	3	2	3	--	2	2	3
CCG501-5	--	--	3	-	2	3	-	2	3

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

CONTENT:

A) 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.

B) 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:** 2.1 Product / 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,	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	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).	
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 consolation, 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. 5.4 Incubation 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 RESOURSES

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: 9788122414349

SUGESTED SOFTWARE/LEARNING RESOURSES

Sr. No	SOFTWARE/LEARNING RESOURSES	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/content 1.aspx?id=8andcatid=8andmid=488
9	Market Review	http://www.businesstoday.in/markets
10	Start Up India	http://www.startupindia.gov.in/pdffile.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://wwwtatasocial-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

1. 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.

2. 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.**

3. 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.

4. 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**	**2**	**3**	**3**
CCG502-1	**1**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CCG502-2	**-**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**
CCG502-3	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
CCG502-4	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**3**
CCG502-5	**2**	**2**	**3**	**3**	**-**	**-**	**2**	**3**	**3**

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

5. 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 i***ndustries 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.

6. 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 3rd 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 4th semester
3	Communication with Industry / Organization available for training along with capacity and its confirmation	Before first Unit Test of the 4th semester
4	Obtaining consent letter from parents / guardian (Format - 2)	Before second Unit Test of the 4th semester
5	Student enrollment for In-plant training (Format-3)	Before commencement of 4th semester examination
6	Issue letter to the Industry / Organization for the training along with details of students and mentors. (Format - 4)	During 4th 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 5th semester ESE

Suggestions:

a) 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.

b) 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.

c) 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.

d) 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.

7. 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.**

8. 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.

9. 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

10. 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.

11. 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

Training duration	PROGRESSIVE ASSESSMENT (*Weekly report of all 4week and attendance)*		END SEMESTER ASSESSMENT (*Seminar and Oral)*		Total marks	
Six weeks	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 marls
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.	Enrolment Number	Name of student	**Marks**					**PA Marks by Industry Supervisor**	**PA based on Report by mentor or faculty**	**Total**
			Week 1(Out of 10)	Week 2(Out of 15)	Week 3(out of 10)	Week 4(Out of 5)	**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 (To be design by programme department)

Marks for Industrial Training Report	Marks for Seminar/ Presentation	Marks for Oral/Viva-voce	Total ESE marls
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

1. 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.

2. 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.**

3. 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.

4. 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	3	3	3	2	3	3
CCG502-1	**1**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CCG502-2	**-**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**
CCG502-3	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
CCG502-4	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**3**
CCG502-5	**2**	**2**	**3**	**3**	**-**	**-**	**2**	**3**	**3**

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

5. 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 i***ndustries 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.

6. 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 4th 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 5th semester
3	Communication with Industry / Organization available for training along with capacity and its confirmation	Before first Unit Test of the 5th semester
4	Obtaining consent letter from parents / guardian (Format - 2)	Before second Unit Test of the 5th semester
5	Student enrollment for In-plant training (Format- 3)	Before commencement of 5th semester examination
6	Issue letter to the Industry / Organization for the training along with details of students and mentors. (Format - 4)	During 5th 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 5th semester ESE

Suggestions:

a) 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.

b) 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.

c) 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.

d) 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.

7. 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.**

8. 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.

9. 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

10. 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.

11. 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

Training duration	PROGRESSIVE ASSESSMENT (*Weekly report of all 4week and attendance)*		END SEMESTER ASSESSMENT (*Seminar and Oral)*		Total marks	
Six weeks	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 marls
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 (To be design by programme department)

Marks for Industrial Training Report	Marks for Seminar/ Presentation	Marks for Oral/Viva-voce	Total ESE marls
25	25	25	75

COURSE ID:

Course Name : OPTICAL FIBER COMMUNICATION
Course Code : ETG504
Course Abbreviation : GOFC

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	50I	150

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

RATIONALE:

Now a days transmission Medias have become most important aspect of Telecommunication industry. Fiber optic Technology has become the backbone of the Telecommunication industry this development is going on so rapidly, to cope up with these latest technologies, students need to study the specialized subjects like fiber optic. They must understand the need of increasing data rate and lossless transmission medium. Use electronic components in electronic equipment.

COMPETENCY:

Maintain optical fiber communication systems.
Cognitive : Identify and illustrate the functions of optical fiber communication systems.
Psychomotor : Maintain and operate components of optical fiber communication system and network. .
Affective : Attitude of i) Logic ii) accuracy iii) precision iv) punctuality

COURSE OUTCOMES:

ETG504-1 Interpret functions of various blocks optical fiber communication system and calculate the various parameters of light. .
ETG504-2 Identify and use the optical fiber types, structures, splicing techniques, connectors and coupling devices.
ETG504-3 Measure different types of losses in optical fiber communication using measurement technique.
ETG504-4 Select proper optical sources and use it in OFC system as per requirement.
ETG504-5 Select proper optical detector and use it in OFC system as per requirement.
ETG504-6 Maintain driving circuitry in OFC system and Identify elements of optical network.

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 and develop optical fiber communication systems for different engineering applications.	**2**	**2**	**1**	**2**	**-**	**-**	**1**	**2**	**1**
ETG504-1 . Interpret functions of various blocks optical fiber communication system and calculate the various parameters of light .	**2**	**1**	**1**	**1**	**-**	**-**	**1**	**1**	**1**
ETG504-2 Identify and use the optical fiber types, structures, splicing techniques, connectors and coupling devices.	**-**	**-**	**1**	**1**	**-**	**-**	**1**	**2**	**1**
ETG504-3 Measure different types of losses in optical fiber communication using measurement technique	**1**	**2**	**1**	**1**	**-**	**-**	**1**	**1**	**1**
ETG504-4 Select proper optical sources and use it in OFC system as per requirement	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**2**	**1**
ETG504-5 Select proper optical detector and use it in OFC system as per requirement	**1**	**-**	**1**	**1**	**-**	**-**	**1**	**2**	**1**
ETG504-6 Maintain driving circuitry in OFC system and identify elements of optical network.	**-**	**-**	**1**	**1**	**-**	**-**	**1**	**2**	**2**

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1	Numerical Aperture of fiber	Measure Numerical Aperture of optical fiber	ETG504-1
2	Acceptance angle of Given optical Fiber cable	Calculate acceptance angle of given optical fiber cable	ETG504-1
3	Types of optical fiber cable.	i)Identify various types of optical fiber cables ii) Differentiate characteristics of it.	ETG504-2
4	Fiber optics analog transmission	Analyze and verify the relationship between input signal and received signal	ETG504-2
5	Fiber optics digital transmission	Analyze and verify the relationship between input signal and received signal	ETG504-2
6	Characteristic of fiber optic communication link	Verify and plot characteristics of fiber optic link i.e.V0/Vin	ETG504-2
7	Bending losses in optical fibers	Measure bending losses in various types of optical fibers	ETG504-3
8	Propagation or attenuation loss in optical fiber	Measure attenuation in given optical fibers	ETG504-3
9	Test performance of optical source LED	Analyze and plot V-I characteristics of red, green and yellow color LED.	ETG504-4
10	Test performance of optical source LASER-diode	Analyze and plot V-I characteristics of Laser- diode	ETG504-4
11	Test performance of optical detector PN Photodiode	Verify and plot characteristics of PN Photodiode	ETG504-5
12	Test performance of optical detector PIN Photodiode	Verify and plot characteristics of PIN Photodiode	ETG504-5
13	Test performance of optical detector Avalanche Photodiode(APD)	Verify and plot characteristics of Avalanche Photodiode(APD)	ETG504-5
14	Test performance of optical detector Phototransistor	Verify and plot characteristics of Phototransistor	ETG504-5
15	OTDR	Analyze the function of Optical Time Domain Reflectometer front panel	ETG504-6

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) Undertake a survey of different types optical cables, give its specifications and applications.
b) Prepare a report on splicing techniques used at Reliance or BSNL or any other such organization
c) Observe various optical couplers used in industries.
d) Prepare a survey report to compare technical specification of different types of optical connectors.
e) Using LED as optical source, photodiode as optical detector and plastic fiber cable make a prototype optical communication system.
f) Prepare a survey report to compare technical specification of different types of optical sources and detectors.
g) Undertake survey reports of different OTDRs available in market, along with their specifications.
h) Undertake the survey of optical fiber network system available in your area along with specifications.

B) THEORY :

SECTION I

Chapter	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
***ETG504-1**. Interpret functions of various blocks optical fiber communication system and calculate the various parameters of light .*			
01	**Fundamentals of fiber optic communication** 1.1 Block diagram of optical fiber com. System 1.2 Advantages, disadvantages and applications of optical fiber communication 1.3 Spectrum of light. 1.4 Concept of photon, energy of photon. 1.5 Light intensity and optical power and its units. 1.6 Reflection , refraction of light ,refractive index and Snell's Law. 1.7 Total internal reflection , critical angle, acceptance angle, acceptance cone ,Numerical aperture 1.8 Numerical based on above theory	**06**	**08**

ETG504-2 *Identify and use the optical fiber types, structures, splicing techniques, connectors and coupling devices.*			
02	**Optical fiber cable** 2.1 Construction Of Optical Fiber Cable 2.2 Classification of optical fibers based on 2.2.1 Material used – Glass fibers, plastic fibers , 2.2.2 Index profile – Step index , Graded index, 2.2.3 Modes of propagation- single mode , Multimode fibers. 2.3 Light propagation in SI and GI fibers, Single and multimode fibers 2.4 Comparison of various fiber types 2.5 Optical Fiber cable Structure: Tight buffered, loose buffered 2.6 Fiber splicing techniques-Fusion Splicing and Mechanical Splicing- Snug tube, Loose Tube, V-groove and Elastomeric Splicing. 2.7 Optical fiber connectors- requirements, Types-FC, ST, MT-RJ and MTP/MPO Connectors. 2.8 Optical Couplers and its types	**10**	**16**
ETG504-3 *Measure different types of losses in optical fiber communication using measurement technique*			
03	**Signal Degradation in Optical Fibers.** 3.1 Attenuation in optical fibers and its units. 3.2 Material absorption losses in silica glass Fibers- intrinsic and extrinsic absorption. 3.3 Scattering losses – linear and nonlinear 3.4 Fiber bend losses 3.5 Dispersion –intramodal , intermodal 3.6 Simple Numerical based on attenuation loss only. 3.7 Numerical aperture measurement 3.8 Attenuation Measurement: Cutback technique & insertion loss method 3.9 Eye patterns techniques	**08**	**16**
	Total	**24**	**40**

SECTION II

Chapter	Topic Subtopics	Teaching Hours	Theory Evaluation Marks
ETG504-4 *Select proper optical sources and use it in OFC system as per requirement*			
04	**Optical Sources.** 4.1 Types and requirements of optical sources. 4.2 Criteria for choosing material of source & Materials used for construction of optical Sources. 4.3 Direct and indirect Bandgap Semiconductor 4.4 LED: Concept Homojunction and hetrojunction LED, materials used for construction of LED 4.4.1 Types of LED :- a) Planar LED: construction and working	**10**	**16**

	b) Surface emitting: construction and working c) Dome emitting: construction and working d) Edge emitting LED: construction and working 4.4.2 Characteristics of LED's: Optical output Power ,output spectrum, 4.4.3 Advantages , disadvantages & application of LED's 4.5 LASER :-Materials used for construction 4.5.1 Principle Of working :Absorption, Spontaneous, stimulated emission & population inversion of radiation 4.5.2 Characteristics of LASER: Monochromatic, Directional & coherent 4.5.3 Types Of LASER 4.5.4 Fabry –Perot Cavity Resonator- construction and working 4.5.5 Semiconductor injection laser- construction and working 4.5.6 Gain guides and index guided laser- construction and working 4.5.7 Advantages, Disadvantages and application of LASER 4.6 Comparison between LED and LASER		
ETG504-5 *Select proper optical detector and use it in OFC system as per requirement*			
05	**Optical Detectors.** 5.1Requirements of optical detectors and Principle of optical photo detectors 5.2 Types of photo detectors 5.3 Photo detector characteristics – quantum Efficiency, Responsivity 5.4 p-n Photodiode – 5.4.1 construction and working, 5.4.2 Electrical Characteristic 5.4.3 Spectral response 5.4.4 Advantages, disadvantages, application 5.5 p-i-n photodiode – 5.5.1 Construction and working, 5.5.2 Electrical Characteristic , 5.5.3 Spectral response, 5.5.4 Speed of response, 5.5.5Advantages, disadvantages, application 5.6Avalanche photodiode – 5.6.1 Construction and working 5.6.2 Spectral response, 5.6.3 APD characteristics:- sensitivity, Operating speed ,noise 5.6.4 Advantages, disadvantages, application 5.7 Phototransistor – 5.7.1 Cross section 5.7.2 Electrical characteristics 5.8 Photo- Darlington.	**8**	**14**

	5.9 Comparison of various photo detectors		
***ETG504-6**. Maintain driving circuitry in OFC system and identify elements of optical network.*			
6	**Optical fiber communication system and optical network** 6.1 International Standards of OFC 6.2 The optical transmitter circuit- 6.2.1Source Limitations , 6.2.2 LED drive circuits 6.2.3 Laser drive circuits. 6.3 The optical receiver circuit – 6.3.1 Block diagram 6.3.2 Preamplifier 6.3.3 AGC 6.3.4 Equalization. 6.4 WDM Basic Concepts and features 6.5 Optical power budgeting. 6.6 Optical Time Domain Reflectometer (OTDR): Working Principle, Specification and Applications 6.7 Optical network:- 6.7.1Features and applications 6.7.2 Elements of optical network 6.7.3 SONET- Architecture, SONET layers, application of SONET	**06**	**10**
	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./Section	Name of topic	Distribution of marks (Cognitive level-wise)			Course outcome	Total Marks
		Remember	Understand	Application		
1	Fundamentals of fiber optic communication	04	00	04	ETF504-1	08
2	Optical Fiber cable.	08	04	04	ETF504-2	16
3	Signal Degradation in optical fibers	06	06	04	ETF504-3	16
4	Optical Sources	06	06	04	ETF504-4	16
5	Optical Detectors	04	06	04	ETF504-5	14
6	Optical fiber communication system and optical network	04	04	02	ETF504-6	10
	Total	**32**	**26**	**22**		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/Algoritm/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/ Algoritm/ 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.	John Senior	Optical Fiber Communication	PHI Publication
2.	Gerd Keiser	Optical Fiber Communication	TMH Publication
3	Deboo , Burros	Integrated circuits and semiconductor devices	Tata McGraw Hill

b) Websites:

1) http://www.physicsclassroom.com
2) http://scienceworld.wolfram.com/physics/
3) www.pearsoned.co.in
4) www.nptel.ac.in

* * *

COURSE ID:

Course Name : MOBILE AND WIRELESS COMMUNICATION

Course Code : ETG505

Course Abbreviation : GMCM

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 IV.

RATIONALE:

The glorious 21st century marks the mobile radio communication industry by orders of magnitude. The recent exponential growth in cellular mobile communication needs more skilled technicians for operation, maintenance & servicing of mobile cellular system. This subject is classified under technology group and it is based on communication theory, which gives theoretical as well as practical knowledge of different cellular system. It covers digital cellular mobile system. It covers digital cellular mobile system such as GSM, IS – 95 standards, WLL, call processing & basic of mobile communication system.

COMPETENCY:

Maintain mobile communication system.

Cognitive: Identify and choose wireless and mobile communication systems as per application.

Psychomotor: Maintain and operate different wireless and mobile communication systems.

Affective: Attitude of i) Recognize ii) Describe iii) Punctuality iv) Precision.

COURSE OUTCOMES:

ETG 505- 1 Compare operation of different mobile communication system and standards
ETG 505- 2. Troubleshoot various blocks mobile handset.
ETG 505- 3. Identify and calculate various parameters of cellular system
ETG 505- 4. Interpret GSM system architecture and use it as per requirement
ETG 505- 5 Interpret CDMA system architecture and use it as per requirement
ETG 505- 6 Choose proper wireless communication systems 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 Maintain mobile communication system.	2	3	2	1	-	-	1	3	3
EIG505-1	2	1	2	-	-	-	-	2	2
EIG505-2	-	3	2	-	-	-	-	2	2
EIG505-3	2	3	3	1	-	-	1	2	2
EIG505-4	2	2	2	1	-	-	-	3	3
EIG505-5	2	2	2	1	-	-	-	3	3
EIG505-6	2	-	2	1	-	-	1	3	1

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 out of 16 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	Identify different sections and components of mobile phone	1)Identify different sections and components of mobile phone such as input section, dialer section, receiver section and transmitter section, microphone, speaker, flash light 2) Write function of each.	ETG 505-2

		3) Measure and note down voltages at various test points.	
2.	Identify the inbuilt sensors of mobile handset and test their performance.	1) Identify the inbuilt sensors of mobile handset 2) Test their performance.	ETG 505-2
3.	Test performance of SIM card	1) Identify various pins of sim card and their functions. 2) Test the SIM card using kit/software	ETG 505-2
4.	Test transmission of call from mobile	1) Identify the components on GSM modem and identify the commands for executing call control commands. 2) Use GSM modem and identify various call control AT commands...	ETG 505-1,3
5.	Test reception of call from mobile	1) Identify the components on GSM modem and identify the commands for executing call control commands. 2) Use GSM modem and identify various call control AT commands.	ETG 505-1,3
6.	Perform cold test of different sections of mobile phone unit.	Measure and note down resistance of different sections of mobile	ETG 505-2
7.	Test the supply of the Transmitter /Receiver section of mobile phone unit.	1)Draw the output waveforms at transmitter/receiver sections of mobile handsets 2) Measure voltages at output of transmitter/receiver.	ETG 505-2
8.	Test the Battery charger section and power management unit of mobile phone unit.	1) Measure power supply section voltages 2) Measure battery and section voltages.	ETG 505-2
9.	Test the LCD and SIM section of mobile phone unit.	1) Identify the display section and SIM section 2) Measure voltages at relevant test points.	ETG 505-2
10.	Test the User Interface section (Keyboard Buzzer, Vibrator, LED,MIC and speaker) of Mobile phone unit.	1) Identify the user interface section 2) Measure voltages at relevant test points.	ETG 505-2
11.	Troubleshoot the speaker problem, Ringer problem, microphone & vibrator problem	1)Test various faults in different section of mobiles 2) Compare voltages with standard voltages.	ETG 505-2
12.	Determine the coverage area of a split cell which has radius half the radius of	Calculate coverage area of the cell	ETG 505-3

	original cell.		
13.	Determine the channel capacity of a cellular system service areacomprised of 4/7/12 microcells with 8/12/16 channels per microcell.	Use relevant software such scilab/matlab.Calculate the channel capacity of cellular systems.	ETG 505-3
14.	Determine the channel capacity if each microcell in the above lab exercise split into 4 minicells and each minicell is further split into4 microcells	Use relevant software such scilab/matlab.Calculate the channel capacity of cellular systems	ETG 505-3
15.	Build a Personal Area Network of mobile devices using Bluetooth	1) Use Bluetooth device to create small area network. 2) Identify various setting required for creating network.	ETG 505-6
16.	Test the hard reset function, hotspot and other networking functions of the given smart phone	1) Learn hard reset of a mobile handset. 2) Identify various setting required for creating network.	ETG 505-6

A.2 Micro-project

Each student should 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.

The micro-project could be industry application based, internet-based, workshop- based, laboratory-based or field-based. 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 suggestive list of micro-projects is given here. The concerned faculty could add similar micro-projects:

i. Compare the specifications/ features / technology of different types of mobile phones available in the market (Min 12 specifications).
ii. Collect the information regarding the special services provided by various mobile service providers (Min 4) in your area.
iii. Prepare a report on TRAI regulations related to mobile communication.(spectrum allocation)
iv. Prepare a report on FCC regulations for spectrum allocation/interference/ Qos for mobile communication.
v. Prepare a brief report on how radiations from BTS and handsets affect Human beings.
vi. Market survey on various wireless devices available in the market.(wireless hands free, wireless speaker. wireless charger)
vii. Prepare a short report on Li-Hi (light fidelity) technology.
viii. Collect detailed information on various wireless technologies based on IEEE standard, frequency band, speed, range, advantages and disadvantages and submit the brief report of it.

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
ETG 505- 1 *Compare operation of different mobile communication system and standards*			
1.	**Introduction to wireless communication system** 1.1 Evolution of mobile radio communication 1.2 Mobile radio standards-AMPS,N-AMPS,IS-95,UMTS,CDMA2000 1.3 Related definition base station, control channel, forward channel ,reverse channel, mobile station, hand-off, mobile switching center(MSC),Transceiver 1.4 Types of wireless communication system diagram and working 1.4.1 Paging system 1.4.2 Cordless Telephone System 1.4.3 Cellular Telephone system: how cellular telephone call is made	07	12
ETG 505- 2. *Troubleshoot various blocks mobile handset.*			
2.	**Mobile unit** 2.1 Block Diagram and operation of mobile unit of 2G mobile phone 2.2 Block diagram and operation of sub-units of 2G mobile phone 2.2.1 Transmitter 2.2.2 Receiver, 2.2.3 Frequency synthesizer 2.2.4 Logic unit 2.2.5 Control unit 2.5 Block Diagram and operation of mobile unit of 4G LTE smart mobile phone 2.6 Sensors: speakers,camera,touch screen, motion sensors and other common sensors	05	10
ETG 505- 3. Identify and calculate various parameters of cellular system			
3	**The cellular concept**. 3.1 Introduction a basic cellular system.- 3.1.1 Block diagram and description 3.1.2 Advantages of cellular concept 3.1.2 Cell,cluster,cell structure 3.2 Frequency reuse, capacity of cellular system, frequency reuse factor and simple numerical.	12	18

	3.3 Channel assignment strategies 3.4 Hand off, Types of hand off, hard hand off, soft Hand off , delayed and queued hand off 3.5 Interference & system capacity. 3.5.1 Co channel interference & system capacity. 3.5.2 Channel planning for wireless system. 3.5.3 Adjacent channel Interference. 3.5.4 Power control for reducing interference (Closed loop, Open loop) 3.6 Improving coverage and capacity in cellular System. 3.6.1 Cell splitting. 3.6.2 Sectoring. 3.6.3 Repeater for range extension. 3.6.4 Micro cell zone concept.		
	Sub-total	**24**	**40**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
ETG 505- 4. Interpret GSM system architecture and use it as per requirement			
4	**GSM mobile systems**. 4.1 G.S.M services & features. 4.1.1 GSM services: Telephone services, bearer or data services, supplementary ISDN services 4.1.2 GSM Features: SIM,On air privacy 4.2. G.S.M system architecture 4.3 G.S.M radio subsystems. 4.4 G.S.M channel types: GSM traffic channels and control channels 4.5 Call routing in GSM: Mobile terminated call and mobile originated call sequence and stages of call processing in GSM. 4.6 Privacy & security in GSM.	09	14
ETG 505- 5 Interpret CDMA system architecture and use it as per requirement			
5	**CDMA mobile systems**. 5.1 CDMA digital cellular standard IS-95. 5.2 IS.95 frequency & channel specification 5.3 IS-95 channel structure 5.4 IS-95 system architecture. 5.5 IS-95 CDMA calls Processing. 5.6 Security & identification in IS-95 CDMA 5.7 Features of IS-95	09	14
ETG 505- 6 Choose proper wireless communication systems as per requirement.			
6	**Modern wireless communication system** 6.1 PANs: Types and examples	06	12

	6.2 Bluetooth-Features, frequency band and architecture 6.3 Signal system no.7 (SS7)—Primary characteristics, functions, protocol architecture and performance services. 6.4 Mobile IP: Features,Toplolgy(architecture) and working 6.5 3G W-CDMA (UMTS) (Universal mobile Telecommunication system.):Features and air specifications 6.6 Next generation mobile standards: Features of 4G,4G-LTE,VOLTE,4.5G, 5G 6.7 Next generation network (NGN): Convergence towards NGN,Features of NGN and services offered by NGN 6. 8 Wireless local loop & LMDS (local multipoint distribution):Features and architecture 6.9 Mobile WiMAX: Features and application		
	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 wireless communication system**	04	04	04	ETG505-1	12
2	**Mobile unit**	02	04	04	ETG505-2	10
3	**The cellular concept**	04	06	08	ETG505-3	18
4	**GSM mobile systems**	02	04	08	ETG505-4	14
5	**CDMA mobile systems**	02	04	08	ETG505-5	14
6	**Modern wireless communication system**	02	06	04	ETG505-6	12
	Total >>	**16**	**28**	**36**		**80**

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

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.*

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.	T.S. Rappaport	Wireless Communication Principles & Practice	Pearson Education
2.	William Lee	Mobile Cellular Telecommunication	Tata McGraw Hill
3	AsokeTalukder&RoopaYavagal	Mobile Computing	Tata McGraw Hill

b) Websites

1) http://www.physicsclassroom.com

2) http://scienceworld.wolfram.com/physics/
3) www.pearsoned.co.in
4) Bluetooth technology:- www.radio- electronics.com/info/wireless/Bluetooth /b1uetooth overview.php
5) 5G Wireless Technology:- https://www.qualcomm.com/invention/5g/technologies
6) Wireless Networks : NPTEL Video lectures :- https://www.youtube.com/watch?v=Eu mTZxPofl
7) TRAI official website: www.trai.gov.in/
8) Mobile phone repairing tools and equipments : - www.mobi1ecel1phonerepairing.com › Mobile Phone Repairing Tools

* * *

COURSE ID:

Course Name : PROJECT II
Course Code : EIG506
Course Abbreviation : GPR2

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : EIG404

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 analyzed information.
Psychomotor: Operate and Maintain of a prototype for an industrial application.
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	-	-

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

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 thePCB layout design. b) Identify components and assure their ratings	1.1 Physical creation of Printed Circuit Board 1.2 Verification of Component ratingsand specifications

	c) Write actual code from algorithm	1.3 Develop the flowchart for program and write the code.
Stage– II Component Mounting and soldering/rect ification 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 andLoading/ 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 Implementationon	a) Execute program b) Test for various inputs c) Troubleshoot final hardware/softwar e	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/softwarefor unexpected/faulty behavior 4.4 Correct Hardware/software and execute the program until getting desired/expected response.
Stage – V Model design	a) Prepare model design b) Create model c) Test Model	5.1 Design model and 5.2 Create list of requirements for implementation of model 5.3 fabricate and construct model Connect circuit responses to modeland test model for its working
STAGE – 6 Documentation and presentation	c) Prepare project report. d) 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

(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 department)
- 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 finalize 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.

Continuous 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 continuous 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

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

ii)

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**

b) 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*

c) 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 examiner 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:

a) Books / Journals / IS Codes

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

b) Websites:

1) www.efy.com
2) www.electronicshub.org
3) www.datasheet.com
4) http://www.electronicshub.org
5) http://www.engineersgarrage.org
6) http://www.electronics-project-design.com
7) http://www.eleccircuit.com
8) http://www.circuit-projects.com
9) http://www.electronicsproject.org
10) http://www.circuiteasy.com
11) http://www.electronics-project-design.com
12) http://www.electronicsschematic.com

c) Magazines:

1) Electronics for you
2) Digital Electronics
3) Electronics Design
4) Electro pages

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F16: Project 1 and 2 Weekly Progress Report

GOVERNMENT POLYTECHNIC, KOLHAPUR

Department: _____

Final Year Project Work: Weekly Progress Report

Semester: I/II	**Week No:**	**Date:**
Objective		
Problem		
Solution/Discussion		
Next Week Task		

Detailed Planning of Project Work :

SN	Activity	Details	Date of completion
	Finalization of students' groups and assignment of project guide (Performa P-2)	Policy to be decided by Programme department	
	Identification and finalization of topic (Performa P-1)	• Review of previous projects • Brain storming session for project ideas • Internet search for topic • Industry / field problem search	
	Preparation and presentation of project synopsis including project completion plan (Performa P-3)	• 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	
	Demonstration-1 (term-1 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
	Preparation of seminar report and Presentation of work done till the end of 5th semester with PowerPoint presentation(seminar) (Performa P-6 & P-5)	• Submission of seminar project report with conclusion of project • PowerPoint presentation • Assessment as per prescribed rubrics	
	Demonstration-2 (mid-term-2 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
	Preparation of final year project report and presentation of working model of project with PowerPoint presentation (Performa P-6 & P-5)	• Submission of final project report with conclusion of project • PowerPoint presentation • Assessment as per prescribed rubrics	
	Final examination	As per curriculum specifications	

F17: Project Sheet "Proforma P1"

Proforma P1

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 Discipline 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
1…..									
2…..									
3…..									

Details of Students' Group : Project Batch - ……

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

F18: Finalization of Project Groups, Topics and Guides "Proforma P2"

Proforma P2

FINALIZATION OF PROJECT GROUPS, TOPICS AND GUIDES

Programme : **Academic Year :** **Class :**
Date :

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

F19: Project 1 and 2 Individual and team performance "Proforma P3"

Proforma P3

ASSESSMENT RUBRICS FOR SYNOPSIS OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total *(Out Of 25)*
		Feasibility Study (5)	Objective and Scope (5)	Block diagram/Design and description (5)	Methodology/ Planning of work (5)	Expected outcomes/ result, References (5)	

Signature of Project Guide

F20: Project 1 and 2 Individual and team performance "Proforma P4"

Proforma P4

ASSESSMENT RUBRICS FOR DEMONSTRATION-1/2 OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total Out of 50
		Content		Delivery			
		Conceptual Understanding (10)	Relevance & Accuracy (10)	Organization, preparation and effectiveness of delivery (10)	Style, pacing and body language (10)	Time management and Q & A (10)	

Signature of Project Guide

F21: Project 1 and 2 Individual and team performance "Proforma P5"

Proforma P5

ASSESSMENT RUBRICS FOR SEMINAR REPORT OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total (Out Of 25)
		Objective and Scope (5)	Literature Review (3)	Methodology (10)	Conclusion/ References (2)	Report format/ Writing Skill (5)	

Signature of Project Guide

F22: Project 1 and 2 Individual and team performance "Proforma P6"

Proforma P6

ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECT

Programme: **Academic Year:** **Name of Project Guide:**

Project Group ID: **Title of Project:** **Date:**

Sr. No	Roll No.	Assessment point-wise score (out of 5) of each student in project group					Total Out of 50
		Content		Delivery			
		Conceptual Understanding (10)	Relevance & Accuracy (10)	Organization, preparation and effectiveness of delivery (10)	Style, pacing and body language (10)	Time managementt and Q & A (10)	

Signature of Project Guide

COURSE ID:

Course Name : CONSUMER ELECTRONICS

Course Code : EIG507

Course Abbreviation : GENC

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 and Receiver.
EIG507-5 Troubleshoot different types of 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 Electronics & Telecommunication engineering 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 & Telecommunication engineering 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, electorates 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 subtractive color mixing, 3.7 Composite video signal-pedestal height, blanking pulse , color burst, Horizontal sync pulse details, Vertical sync pulse details, equalizing pulses.	**10**	**14**
	Sub Total	**24**	**40**

SECTION II

Sr No	**Topics**	**Teaching hours**	**Marks**
EIG507-4 **Troubleshoot color TV Transmitter and Receiver.**			
4.	**Television systems.** 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 Block diagram of color TV transmitter. 4.4 Troubleshooting procedure of color TV transmitter. 4.5 Block diagram and operation of color TV Receiver. 4.6 Operation of PAL-D decoder. 4.7 Troubleshooting procedure of color TV receiver systems	**08**	**14**
EIG5075-5 **Troubleshoot different types of color TV receivers.**			
5	**Types of Television.** 5.1 HDTV: Development of HDTV, NHK MUSE system and NHK broadcast. 5.2 LCD/LED technology: principle and working of LCD and LED TV. 5.3 Direct to Home receiver(DTH): Concept, receiver	**08**	**12**

	block diagram, indoor and outdoor unit. 5.4 Block diagram and working of OLED. 5.5 Troubleshooting procedure of color different types of TV receiver systems 5.6 Working of Plasma TV.		
***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, Wiring and safety instructions. 6.3 Washing machine: Block diagram and working, electrical specifications, types: automatic and semi-automatic. 6.4 Digital camera and cam coder: pick up devices ,picture processing and picture storage, electrical specifications.	**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	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 systems	06	04	04	EIG507-4	14
5	Types of Television	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/ 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/ Algoritm/ 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.*

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/ Algoritm/ 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.	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:

1) Microphone: http://www.coursehero.com/file/18404103/7-microphoneppt/
2) CD player:www.tcauset.org/cpg132/albums/FTPupLoads/PPT_05/CDs_speroS.ppt
3) Microwave oven: www.calvin.edu/~pribeiro/course/engr302/Samples/Microwave.ppt
4) www.sharpthai.co.th/backoffice/img/download.../ES-D159T-SLWH%20ENG.pdf
5) Photocopier machine: www.youtube.com/watch?v=NxUbPE8RsiM
6) Color TV theory: http//www.slideshare.net/PravinShirke07/colour-television
7) 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:

EIG508-1 Differentiate transducers based on their respective features.
EIG508-2 Identify temperature measuring transducers and temperature measuring methods.
EIG508-3 Choose relevant transducer related to displacement and level measurement for industrial objective.
EIG508-4 Classify and apply appropriate pressure and flow measurement at specific industrial application.
EIG508-5 Use two data transmission method simplex and duplex in the area of telemetry system.
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		-	1	-	-	-	-	-
EIG508-1	2	-	-	1	-	-	-	1	1
EIG508-2	2	-	-	1	-	-	-	1	1
EIG508-3	2	-	-	1	-	-	-	2	2
EIG508-4	2	-	-	1	-	-	-	1	1
EIG508-5	2	-	-	-	-	-	-	-	1
EIG508-6	2	-	-	1	-	-	-	-	1

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication 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 'X' experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	To plot the characteristics of thermocouple	1. Build experimental setup to plot the characteristics of thermocouple	EIG508-2

		2. Plot the characteristics of thermocouple	
2.	To plot the characteristics of RTD	1. Build experimental setup to plot the characteristics of RTD 2. Plot the characteristics of RTD	EIG508-2
3.	To plot the characteristics of Thermistor	1. Build experimental setup to plot the characteristics of Thermistor. 2. Plot the characteristics of Thermistor.	EIG508-2
4.	To measure displacement using LVDT	1. Build experimental setup to measure the characteristics of LVDT. 2. Plot the graph of actual displacement v/s reading obtained 3. Comment on the linearity	EIG508-1
5.	Study of primary and secondary transducer using bourdon tube and LVDT	1. Build experimental setup to understand measure primary and secondary transducer using bourdon tube and LVDT.	EIG508-3,1
6.	To measure weight using strain gauge pressure transducer	Build experimental setup to measure weight using strain gauge pressure transducer..	EIG508-4
7.	To Study of Single channel Data acquisition system with analog output.	Build experimental setup to Study of Single channel Data acquisition system with analog output.	EIG508-6
8.	To Study of Single channel Data acquisition system with digital output.	Build experimental setup to Study of Single channel Data acquisition system with digital output.	EIG508-6
9.	To Study of Multichannel Data acquisition system with digital output. (minimum two physical parameter)	Build experimental setup to Study of Multichannel Data acquisition system with digital output. (minimum two physical parameter)	EIG508-6
10.	Study of level measurement using capacitive transducer	Build experimental setup to measure capacitive transducer of level measurement	EIG508-5
11	Use the potentiometer to measure the linear displacement	Build experimental setup to measure linear displacement of potentiometer	EIG508-1
12	Flow measurement using Variable head flow meter	Build experimental setup to measure flow using Variable head flow meter	EIG508-3

13	Use Venturi meter for flow measurement	Build experimental setup to measure flow using Venturi meter	EIG508-4
14	Use Orifice plate meter for flow measurement	Build experimental setup to measure flow using Orifice plate meter	EIG508-4
15	Study of signal conditioning circuits using any physical parameter at input	Test signal conditioning circuits using any physical parameter at input	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:

1. Micro project 1 title :-Use RTD for indication of temperature.
2. Micro project 2 title:-Use Thermistor for indication of temperature.
3. Micro project 3 title:-Use level transducer for indicating and controlling the level of water tank.
4. Micro project 4 title:-Use float type level sensor for indication of level of water tank.
5. Micro project 5 title:-Use pressure transducer for indicating and controlling the compressor utility system.
6. Micro project 6 title:-Use strain gauge for weight measurement simple platform.

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG508-1 Differentiate transducers based on their respective features.			
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 1.3.2 Strain gauge:-Operating Principle .1.3.2.1 Types of Strain gauge 1.3.2.1.1 Bonded Strain gauge 1.3.2.1.2 Unbounded Strain gauge 1.3.2.1.3 Comparison between Bonded and Unbounded Strain gauge 1.4 Capacitive Transducer 1.4.1 Transducer using variation in area of plates 1.4.2 Transducer using variation in distance between two plates 1.5 Inductive Transducer 1.5.1 LVDT 1.6 Selection Criteria for Transducers:-Operating range, Operating Principle,Sensitivit,Accurcy,Frequency response and resonant frequency, Errors	08	14
EIG508-2 Identify temperature measuring transducers and temperature measuring methods.			
02	**Temperature measurement** 2.1 Definition of Temperature 2.2 Temperature scales and conversion 2.3 Electrical Methods of temperature measurement 2.3.1 Resistance thermometer (PT100) or Resistance Temperature Detector (RTD):-Operating principle, construction and working	10	14

	2.3.2 PT100-Operating range, advantages ,distadvantages,application 2.4 Thermistors-Operating principle, construction and working 2.4.1 PTC and NTC 2.4.2 Comparison between NTC and PTC 2.5 Thermocouple:Principle,construction and working 2.5.1 Seeback effect 2.5.2 Peltier effect 2.5.6 Types of Thermocouples (J,K,R,S and T) based on Materials and Temperature 2.6 Pyrometers . 2.6.1 Radiation pyrometer:- Principle,construction,working,advantages,disadvantages,application 2.6.2 Optical pyrometer:- Principle,construction,working,advantages,disadvantages,application		
EIG508-3 Choose relevant transducer related to displacement and level measurement for industrial objective.			
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
EIG508-4 Classify and apply appropriate pressure and flow measurement at specific industrial application.			
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 4.2.1.1Bourdon 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 4.4Types of Flow 4.4.1 definition Laminar Flow with diagram 4.4.2 definition Turbulent Flow with diagram 4.4.3Comparision 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
EIG508-5 Use two data transmission method simplex and duplex in the area of telemetry system.			
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
EIG508-6 Develop proper signal conditioning circuit and use proper data acquisition system.			
06	**Signal conditioning and Data Acquisition System**	06	14

	6.1 Introduction of Signal conditioning 6.2 Signal conditioning block diagram- AC & DC 6.3 Amplifiers- Chopped & modulated amplifier, 6.4 RFID sensors 6.5Wireless 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		
	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

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	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 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.	Rangan, Mani, Sharma	Electronic Instrumentation	Tata McGraw-Hill Ltd., New Delhi
2.	S. K. Singh	Industrial Instrumentation & Control	Tata McGraw-Hill Ltd., New Delhi
3	A.L.Helfrick & W.D. Cooper	Electronic Instruments & Measurements Techniques	Dorling Kindersly Pvt. Ltd. India
4	A. K. Sawaney.	Electrical & Electronics Measurement & Instrumentation	Dhanpat Rai Publications
5	Oliver & cage	Electronic Measurements & 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) www2.l-3com.com/tw/telemetry_tutorial/r_data_acquisition.
5) www.nptel.ac.in/courses/108105064/#
6) www.engineeringtoolbox.com/flow-meters-d493
7) www.instrunaentaliontools.corn/category/levelisieasurement/
8) www.instrunaentaliontools.corn/category/pressure-measurement/
9) www.electronics-tutorials.ws/io/io_3.html
10) www.isa.org
11) *NPTEL*
12) *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 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 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
EIG509.4Practice industrial safety rules, codes, practices and acts.	-	-	-	-	1	-	1	3	3
EIG509.5 Apply various modern management techniques	-	-	-	-	1	-	1	2	2

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

CONTENT:

A) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG509.1Apply principles of management and carry out various functions of management.			
1	**PRINCIPLES OF MANAGEMENT** 1.1 Concept of management 1.2 Principles of management 1.3 Objectives of management 1.4 Scope and importance of management 1.5 Levels of management 1.6 Managerial competencies : Communication, Planning and Administration, Team work, Strategic action and General awareness	**06**	**10**
2	**FUNCTIONS OF MANAGEMENT** 2.1 Planning: Forms of planning, Strategic levels and Planning, Phases of Planning 2.2 Decision Making: Decision making conditions, Basic types	**08**	**12**

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	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		
3	**HUMAN RESOURCE MANAGEMENT(Personnel Management)** 3.1 Definition and concept, 3.2 Aim, Objectives and functions of HR dept. 3.3 Principles of personnel policy, details recorded in policy 3.4 Recruitment and selection of employees 3.5 Training : Objectives, benefits, types and methods 3.6 Workers Participation in Management	**06**	**10**
EIG509.2 Prepare organization structure for small and medium scale industry.			
4	**FORMS OF BUSINESS ORGANISATION** 4.1Types of industrial sectors 4.2 Forms of business organization 4.3 Individual Proprietorship 4.4 Partnership 4.5 Joint stock companies 4.6 Co-operatives 4.7 Public sectors 4.8 Government undertakings	**04**	**08**
	Total	**24**	**40**
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.			

SECTION II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG509.3Perform duties of stores in-charge, material and finance manager.			
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. 6.5Types 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**
EIG509.4Practice industrial safety rules, codes, practices and acts.			
7	**INDUSTRIAL ACT & SAFETY** 7.1 Factory Act, Boiler Act, Workmen Compensation Act, ESI Act, pollution Control Act 7.2 Accidents: Economic aspects, direct and indirect cost of accidents Causes, Types, Remedies, Personal Protective Equipments (PPE), Reporting & Investigation of accidents 7.3 Safety management: safety in industry, committees, programs, Safety codes, Safety training,	**05**	**10**
EIG509.5Apply various modern management techniques.			
8	**MODERN MANAGEMENT TECHNIQUES** 8.1 PERT & CPM 8.2 Various terms related with network analysis 8.3 Various Time estimates 8.4 Construction of Network Diagram 8.5 Computation of Critical Path	**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

1) nptel/iitm.ac.in
2) 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	-	

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 1Operate and Maintain	PSO 2Supervision 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

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

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 1.1 Concept of marketing, product selling. 1.3 Trends in modern Marketing. 1.2 Difference between sales and marketing.	08	14
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
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)			Course outcome	Total marks
		Remember	Understand	Application		
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	

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COURSE ID:

Course Name : **PROGRAMMABLE LOGIC CONTROLLER**

Course Code : **ETG 511**

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	50I	**150**

* 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 affected 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:

ETG 511-1 Identify various components PLC and illustrate their function
ETG 511-2 Select PLC input and output modules as per need of application
ETG 511-3 Identify and use different types of instructions set in PLC.
ETG 511-4 Develop ladder diagrams for various simple applications
ETG 511-5 Develop ladder diagrams for various advanced industrial and engineering applications
ETG 511-6 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
ETG 511-1	-	1	2	-	-	-	1	2	2
ETG 511-2	-	2	2	2	-	-	-	2	2
ETG 511-3	-	2	2	2	-	-	-	2	2
ETG 511-4	-	3	3	3	2	2	-	3	3
ETG 511-5	-	3	3	3	2	2	-	3	3
ETG 511-6	-	2	2	2	-	-	2	3	3

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication 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 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.	ETG 511-1
2.	Logic gates by using PLC.	Write and Verify truth table of Logic gates by execution of ladder program	ETG 511-4
3.	Boolean Algebra	Verify Boolean equations by execution of ladder program	ETG 511-4
4.	Blinking of LED's	Write and verify ladder program for blinking by using timer.	ETG 511-5
5.	Sequential ON-Off control of Lamps	Write and verify ladder program for traffic signal control for two directions	ETG 511-4,5
6.	Elevator Control	Write and verify ladder program for elevator control	ETG 511-4,5
7.	Tank Level controller	Write and verify ladder program for tank level control	ETG 511-4,5
8.	Counters for pulse counting using limit switch/ proximity sensor	Write and verify ladder program for object counter using counter	ETG 511-4,5
9.	Analog sensor interfacing with PLC.	Write and verify ladder program for any analog sensor such as RTD, thermocouple, thumbwheel switch, etc	ETG 511-4,5
10.	AC Motor control by VVFD	Write, verify and control speed of any AC motor available by using VVFD	ETG 511-4,5
11.	DC Motor Control	Write, verify and control speed of any AC motor available.	ETG 511-4,5
12.	Automated car parking system.	Develop /test ladder program for automated car parking system.	ETG 511-3,5
13.	Stepper motor rotation	Develop / test ladder program for rotating stepper motor in forward and reverse direction at constant speed.	ETG 511-3,5
14.	SCADA Simulator	Use various functions of SCADA simulator editor to develop simple program	ETG 511-6
15.	Tank level controller mimic diagram using SCADA	Develop a SCADA mimic diagram for Tank level control.	ETG 511-6

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. Similar micro-projects could be added by the concerned faculty:

a) **Automatic street light controller:** Prepare a PLC based system to control the street light as per the intensity of natural light.
b) **Automatic agriculture irrigation system:** Prepare a PLC based system to control drip irrigation.
c) **Railway gate automation:** Prepare a PLC and SCADA based system to open or close the proto type rai1way gate automatically.
d) **Home automation:** Implement the versatile automation system for home that can automate any three home appliances.
e) **Bottle filling station:** Prepare a PLC and SCADA based system for proto type bottle filling station.
f) Troubleshoot the Fault Equipment/Kit available in automation Laboratory.

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	ETG 511-1 *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)	09	14

	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) 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		
ETG 511-2 *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.	09	14

	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.		
	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)
	ETG 511-4 *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
	ETG 511-5 *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	09	14

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	5.13 Speed Control of AC/ DC Motor using Programmable Drives		
	***ETG 511-6** 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 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	06	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	Applica--tion		
1	PLC Fundamentals	4	4	6	ETG 511-1	14
2	PLC Hardware	4	4	4	ETG 511-2	12
3	PLC Instruction Set	2	6	6	ETG 511-3	14
4	PLC Programming	2	2	10	ETG 511-4	14
5	PLC Applications	-	4	10	ETG 511-5	14
6	PLC installation and Troubleshooting	2	4	6	ETG 511-6	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.*

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.*

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.p1ctutor.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/au1as/apil3/docs/API I C3 3 ST.pdf

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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 equipment's/system.	1	3	3	1	-	-	-	2	2
EIG 512-1	2	-	1	-	-	-	-	-	-
EIG 512-2	2	2	1	-	-	-	-	-	-
EIG 512-3	2	2	2	1	-	-	-	-	-
EIG 512-4	1	3	3	1	-	1	1	2	2
EIG 512-5	1	3	2	1	-	1	1	3	2
EIG 512-6	1	3	2	1	-	1	1	3	2

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 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	EIG512-2-3

		instructions : MOVLW, ADDWF, SUBWF, SUBFWB	
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 micro project in the beginning of the semester. In 3rd 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:

a) Build an application of flashing display to flash advertisement
b) Build a system to display department name with rolling display
c) Build two digit counter system

d) Build a class period bell system as per the given time table with 7 teaching periods of 1 hour each
e) Build a temperature monitoring system to maintain the given temperature
f) Build automated door control system to open and close the door
g) Build a pollution monitoring system to observe the level of CO2

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG 512-1 Interpret prominent features of different kinds of advance microcontrollers			
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 launch box 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**
EIG 512-2 Interpret the salient architectural features of PIC18f microcontroller			
2	PIC Architecture : 2.1 RISC Architectural feature of PIC 2.2 Feature of PIC18f 2.3 Pin diagram 2.4 Architecture : Working Register (WREG), status register, Special function registers (SFRs) 2.5 PIC file register 2.6 PIC data format & directives 2.7 Bank Switching in PIC18	**08**	**14**
EIG 512-3 Develop and maintain assembly language program for different operations			

3	PIC Instruction & assembly Language Programming: 3.1 Instruction size of PIC18 3.2 Addressing Mode 3.3 Instruction set: Data transfer instruction, Arithmetic instruction logical instruction, Control instruction using branch & Call, Bit oriented instruction, Table processing instruction 3.4 Simple programs	**10**	**16**
	Sub-total	**24**	**40**

SECTION II

Sr. No.	**Topics**	**Teaching hours**	**Marks**
EIG 512-4 Explore programming skills for I/O ports, Timers/Counters of PIC18F			
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**
EIG 512-5 Explore programming skills for Serial ports and CCP/ECCP modes.			
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**
EIG 512-6 Interface and program different external devices with PIC18f in assembly			
6.	External Interfaces: 6.1 ADC Programming 6.2 DAC interfacing and programming 6.3 LCD interfacing and programming 6.4 SPI Interfacing and MSSP module programming 6.5 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

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*

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, 1st 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.

c) Websites

1) www.nptel.com
2) www.datasheet.com
3) www.pic.com
4) www.microchip.com/pic/
5) http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
6) 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 Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 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	• Locate different components of car.	EIG513-2,3

		• Explain the operation of each.	
2	To know symbols of components connectors, wires.	1. Identify the different symbols used for components. 2. Explain the use of wiring diagram.	EIG513-3,4
3	Interpret the wiring diagram and understand different electrical circuits.	1. Interpretation of wiring diagram. 2. Explain 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. Explain the interfacing of control units.	EIG513-3,4
5	To perform Alternator test	1. Identify the fault. 2. Explain the procedure of testing alternator.	EIG513-4
6	To perform Starter circuit test	1. Identify the fault. 2. Explain the procedure of testing starter circuit.	EIG513-4
7	To test battery	1. Identify the fault. 2. Explain 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. Explain 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. Explain 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. Explain the procedure of fual injection, cam shaft adjustment.	EIG513-3
11	To study Antilock Braking System (ABS)	1. Explain the ABS system 2. Identify the instrumentation and control involving	EIG513-4
12	To study Electronic Suspension System (ESS)	1. Explain the ESS system 2. Identify the instrumentation and control involving	EIG513-4
13	To study Electronic Steering Control	1. Explain the ESC system 2. Identify the instrumentation	EIG513-4

	(ESC)	and control involving	
14	To study Fuel quantity measurement	1. Explain the measurement system 2. Identify the instrumentation and control involving	EIG513-5
15	To study onboard diagnostive system (OBD)	1. Explain the OBD 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 individualy 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:

1) 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
2) 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
3) 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
4) Prepare and display board of various Automotive Instrumentation System like- Fuel quantity measurement, Coolant temperature and oil pressure measurement
5) Visit garages for demonstration of actual Onboard Diagnostics (OBD) being performed and collect the details
6) Etc…

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
EIG513-1 Appreciate the operation of microcomputer and its architecture			
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**
EIG513-2 Discover the characteristic details of various sensors and actuators used in automotive electronics			
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**
EIG513-3 Acknowledge the operation of various components of electronic engine management system			
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 3.4.1 Spark advance correction schemes 3.4.2 Fuel injection timing control	**10**	**16**
	Sub-total	**24**	**40**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
EIG513-4 Explore various vehicle management systems used in automobile			
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**
EIG513-5 Explore different automotive instrumentation systems used in automobile			
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**
EIG513-6 Discover electronic safety systems used in automobile			
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

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 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 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	4th edition- Routledge – 2012
3	Barry Hollembeak	Automotive Electricity and Electronics	Delmar Cengage Learning; 5th edition, 2011
4	William B Ribbens	Understanding Automotive Electronics: An Engineering Perspective	Newne Butterworth-Heinermann, 7th edition 2012
5	Kripal Singh Vol I	Automobile Engineering	Standerd Publishers, New Delhi
6	Kripal Singh Vol II	Automobile Engineering	Standerd Publishers, New Delhi

b) Websites

1) *https://www.electronicdesign.com/markets/automotive*
2) *https://www.mentor.com/embedded-software/automotive/*
3) *https://www.avnet.com/wps/portal/apac/resources/article/automotive-electronics-top-5-tech-trends-tomorrows-smart-cars/*
4) *Search for 'Automotive Electronics' on https://www.youtube.com/, https://www.google.com/*
5) *https://www.lacroix-electronics.com/market-sectors/automotive/*
6) *Search 'Automotive Electronics' on https://ieeexplore.ieee.org/*
7) *https://midasmic.com/c1_en.php?class_major_id=1&class_item_id=1*

* * *

COURSE ID:

Course Name : INTRODUCTION TO INTRNET OF THINGS
Course Code : ETG514
Course Abbreviation : GIOT

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	25I	**125**

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

RATIONALE:

Today Internet of Things (IoT) is emerging as a very hot technology worldwide. The IoT integrates the interconnectedness of human culture - our 'things' - with the interconnectedness of our digital information system - 'the internet'. IoT has application in almost all the domains ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today applications such as innovative shopping, infrastructure management, remote health monitoring and emergency notifications, and transportation etc, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology. The objective of this course is acquainting students with this technology and to implement simple IOT applications.

COMPETENCY:

Design, implement and maintain IOT based systems

Cognitive: Understand basic components of IOT.
Psychomotor: Develop simple IOT applications.
Affective: Attitude of i) Logical thinking ability ii) System hardware design skills.

COURSE OUTCOMES:

ETG514-1 Identify and Explain components and applications of IOT
ETG514-2 Acquire fundamentals of NodeMCU and program it using Arduino
ETG514-3 Illustrate IOT sensors and actuators principle of working and select it in an application
ETG514-4 Interface and Program various IOT Sensors and Actuators
ETG514-5 Make use of various components required in IOT implementation
ETG514-6 Design and Develop various basic IOT 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: Design, implement and maintain 8051 microcontroller based embedded systems	3	1	2	1	-	-	1	1	2
ETG514-1	3	-	-	-	-	-	-	-	-
ETG514-2	3	-	1	1	-	-	-	-	-
ETG514-3	2	-	2	-	-	-	-	1	-
ETG514-4	3	1	3	1	-	-	-	1	2
ETG514-5	3	2	3	2	1	1	2	1	2
ETG514-6	3	3	3	3	2	2	2	3	2

PSO 1: Operate and Maintain: Competency to apply the concepts of Electronics & Telecommunication engineering 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 & Telecommunication engineering 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 out of 15 experiments).

Sr No.	Title of Practical Exercise	Skills / Competencies to be Developed	Course Outcome
1.	Identify the different peripherals on NodeMCU-ESP8266 development board and its connections with computer	1) Identify different NodeMCU perpherals 2) Identify various pins of NodeMCU with their function 3) Connecting NodeMCU with computer	ETG514-1, 2 *
2.	Use Arduino IDE for developing simple programs in C/C++	1) Installing Arduino IDE 2) Installing package for NodeMCU 3) Writing programs using in Arduino IDE	ETG514-2 *
3.	Development and execution of the program for connecting LED to digital output and switch to digital input	1) Writing programs in C/C++/Arduino IDE 2) I/O interfacing and programming NodeMCU	ETG514-3, 4 *
4.	Development and execution of the program for Relay control	7) Writing programs in C/C++/ Arduino IDE 8) Relay interfacing and programming NodeMCU	ETG514-3, 4 *
5.	Development and execution of the program for for scanning Wifi networks and connecting to a particular Wifi network	1) Writing programs in C/C++/ Arduino IDE 2) Connecting WiFi with NodeMCU	ETG514-3, 4 *
6.	Development and execution of the program for light intensity monitoring using LDR and outputting it to LED	1) Writing programs in C/C++/ Arduino IDE 2) Interfacing and programming NodeMCU for monitoring environment parameter	ETG514-3, 4 *
7.	Development and execution of the program for object detection using IR Sensor and displaying it on LED using Local Server	1) Writing programs in C/C++/ Arduino IDE 2) Interfacing and programming NodeMCU for object detection	ETG514-3, 4 *
8.	Development and execution of the program for LED controlling using Blynk App update	1) Writing programs in C/C++/ Arduino IDE 2) Interfacing and programming NodeMCU with Blynk app	ETG514- 4 *
9.	Development and execution of the program for Temperature-Humidity monitoring and display in Blynk App update	1) Writing programs in C/C++/ Arduino IDE 2) Temperature-Humidity sensor interfacing and programming	ETG514- 4

		NodeMCU, Blynk app	
10.	Development and execution of the program for controlling DC motor using Local Server	1) Writing programs in C/C++/ Arduino IDE 2) DC motor Interfacing and programming NodeMCU	ETG514- 4 *
11.	Development and execution of the program for distance measurement using Ultrasonic sensor and display it in Blynk App or update on Web server (ThingSpeak)	1) Writing programs in C/C++ 2) Interfacing and programming NodeMCU with Blynk app, ThingSpeak	ETG514- 4, 5
12.	Design and develop Home automation system for monitoring and control of any 3 sensors/actuators using Blynk app	1) Design IOT application 2) Writing programs in C/C++/ Arduino IDE 3) Sensors/Actuators interfacing and programming NodeMCU with Blynk app	ETG514- 5, 6
13.	Design and develop application to upload data from environmental Sensors (e,g, DHT11) to Cloud server (Using open source IOT application – ThingSpeak(Mathworks Inc))	1) Design IOT application 2) Writing programs in C/C++/ Arduino IDE 3) Environmental sensors interfacing and programming NodeMCU with ThingSpeak	ETG514- 5, 6
14.	Design and develop application to control home devices using Google Assistant	1) Design IOT application 2) Writing programs in C/C++/ Arduino IDE 3) Interfacing and programming NodeMCU withThingSpeak	ETG514- 5, 6
15.	Control home devices from self-hosted webpage on Amazon AWS Cloud	1) Design IOT application 2) Writing programs in C/C++/ Arduino IDE 3) Interfacing and programming NodeMCU with AWS	ETG514- 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 individualy 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:

1. Agriculture: Fertilizer dripping system
2. Healthcare: Automation in existing AMBU bag for medical applications, Body-Mass-Index machine with BMI printing facility.
3. Industrial Automation: Vending machine, Conveyer system, Servo/Setter motor applications
4. Food Industry: Serving bot, Instant Sodium analysis
5. Malls/Restaurants/Colleges/Meeting room: People counting system (Co-relating pandemic situations), mask detection system
6. Education: Monitoring environmental parameters and display on LCD, send data to cloud.
7. Smart Infrastructure: Asset Monitoring system using RFID tags-readers.

8. Robotics: Line tracking bot, Color detection robot, Biped robot
9. Different Home Automation systems
10. Transportation: Automatic Ticket counter system, Vehicle tracking system

B) THEORY :

SECTION I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
ETG514-1 Identify and Explain components and applications of IOT			
1	**Introduction** 1.1 What is IoT? 1.2 History of IoT 1.3 IOT Architectures and its components 1.4 Functional block diagram of IoT 1.5 IoT Device 1.6 IoT Protocols 1.7 Characteristics of IoT 1.8 Applications of IoT:- 1.8.1 Home automation- Smart Homes 1.8.2 Industrial automation- Smart Cities 1.8.3 Infrastructure and business management 1.8.4 Security systems 1.8.5 Transportation system 1.8.6 Healthcare etc. 1.9 Platforms available for IOT- Comparison and usage:- 1.9.1 Arduino Uno 1.9.2 Rasberry Pi – Zero WH / 3B+ 1.9.3 NodeMCU V3	**6**	**12**
ETG514-2 Acquire fundamentals of NodeMCU and program it using Arduino			
2	**Introduction to NodeMCU and Arduino IDE** 2.1 What is NodeMCU? 2.2 NodeMCU V3 ESP8266 Specifications & Features 2.3 NodeMCU ESP8266 pinout configuration 2.4 ESP12E WiFi module 2.5 Micro USB to Serial(UART) converter (CP2102) 2.6 Arduino IDE:- 2.6.1 What is Arduino IDE? 2.6.2 Introduction to C/C++ 2.6.3 Arduino IDE Setup 2.6.4 Package Installing for NodeMCU 2.6.5 Creating, Compiling and Uploading programs from Arduino IDE to NodeMCU	**10**	**16**

ETG514-3 Illustrate IOT sensors and actuators principle of working and select it in an application			
3	**IOT Sensors and Actuators** **3.1 Sensors:-** 3.1.1 Switches 3.1.2 LDR- Light detection 3.1.3 IR Sensor- Object detection 3.1.4 Temperature-Humidity sensors- DHT11, DHT12, DHT22 3.1.5 Touch Key Sensor 3.1.6 Gas Sensor – MQ2(LPG, Smoke,), MQ3(Alcohol), MQ4 3.1.7 Ultrasonic Sensor- HC-SR04 3.1.8 PIR motion sensor module- HC-SR501 3.1.9 Gyroscope(2D, 3D), Accelrometer sensor **3.2 Actuators:-** 3.2.1 LED 3.2.2 Relays 3.2.3 Servo motor 3.2.4 DC Motor	**8**	**12**
	Sub total	**24**	**40**

SECTION II

Sr. No.	Topics	Teaching hours	Marks
ETG514-4 Interface and Program various IOT Sensors and Actuators			
4.	**Sensors and actuators interfacing and programming** 4.1 Controlling LED to Digital output 4.2 Controlling switch to Digital input 4.3 Controlling output using digital input 4.4 Controlling brightness of LED using PWM 4.5 Serial input and output using Serial Monitor 4.6 Light intensity monitoring 4.7 Object detection using IR Sensor 4.8 Temperature-Humidity monitoring using sensor- DHT11 4.9 Object detection and control, Distance calculation using Ultrasonic Sensor- HC-SR04 4.10 Controling Relays 4.11 Controling Servo motor using PWM 4.12 WIFi Module 4.13 Scanning Wifi networks and connecting to a particular Wifi network	**08**	**14**
ETG514-5 Make use of various componenets required in IOT implementation			

5	**Implementation of IOT** 5.1 IOT communication protocols- HTTP, MQTT 5.2 Access IP address assigned to NodeMCU 5.3 Creating Local web server using NodeMCU ESP8266 module 5.4 Controlling Home appliance using Local Server 5.5 Creating a web page and control Home appliance through Wifi using Local Web Server 5.6 Introduction to API 5.7 Blynk Android App - Using third party Blynk cloud server 5.8 Amazon AWS Cloud - Introduction only 5.9 RFID Technology- Introduction 5.10 LoRA (**Lo**ng **RA**nge)- Introduction to Long range, low power wireless technology platform	**10**	**18**
ETG514-6 Design and Develop various basic IOT application			
6.	**IOT application development** 6.1 Home automation on local and live server- 3 devices monitoring and control (e.g Smoke, Voice Alarm implementation) 6.2 Use NodeMCU to upload data from environmental Sensors (e,g, DHT11) to Cloud server 6.3 Control home devices from self-hosted webpage on Amazon AWS Cloud	**06**	**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		

- **Over the time the Sensors specified, Experiment list and libararies of NodeMCU may change**

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	04	08	00	ETG514-1	12
2	Introduction to NodeMCU and Arduino IDE	04	08	04	ETG514-2	16
3	IOT Sensors and Actuators	04	04	04	ETG514-3	12
4	Sensors and actuators interfacing and programming	02	04	08	ETG514-4	14
5	Implementation of IOT	02	04	12	ETG514-4	18
6	IOT application development	00	00	08	ETG514-5	08
	Total >>	**16**	**28**	**36**		**80**

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

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/ Algoritm/ 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.*

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/ Algoritm/ 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.	ArshdeepBahga, Vijay Madisetti	Internet of Things: A Hands-On Approach By	ArshdeepBahga, Vijay Madisetti
2.	Daniel Minoli	Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications,	Wiley Publications
3.	Hakima Chaouchi	The Internet of Things: Connecting Objects to the Web	Wiley Publications
4.	Michael Miller	The Internet of Things	Pearson Education Inc

5.	S. Misra, A. Mukherjee, and A. Roy	Introduction to Internet of Things	Cambridge University Press. https://www.amazon.in/Introduction-IoT-Sudip-Misra/dp/1108959741/ref=sr_1_1?
6	S. Misra, C. Roy, and A. Mukherjee	Introduction to Industrial Internet of Things and Industry 4.0	CRC Press.

b) Websites

1) *NPTEL Course on "Introduction to IoT"can be accessed here-*
   https://archive.nptel.ac.in/courses/106/105/106105166/
2) *https://www.tutorialspoint.com/internet_of_things/index.htm*
3) *https://www.nodemcu.com/index_en.html*
4) *https://www.arduino.cc/*
5) *https://randomnerdtutorials.com/*
6) *https://components.omron.com/sensor/about-iot*
7) *https://www.tinkercad.com/dashboard?type=circuits&collection=designs*
8) *https://www.abr.com/what-is-rfid-how-does-rfid-work/*
9) *https://www.everythingrf.com/community/what-is-lora*
10) *https://io.adafruit.com/*
11) *https://aws.amazon.com/console/*

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(ANNEXURE)

BRIDGE COURSE FOR DSY STUDENTS

COURSE ID : **---**

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 require*ment*

CONTENTS:

A) THEORY: **SECTION-I**

Sr. No.	Topics	Teaching hours
	CO 1 – Identify and use different Passive Electronic Components.	
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	**03**

	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 1.3.4. Variable Inductors : Examples with diagrams, symbols and applications	
	CO 2 - Illustrate the use of Cables, Connectors and Switches in different applications.	
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**
	CO 3 – Illustrate the use of PCB in different equipment.	
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**
	CO-4 Identify and use semiconductor diodes as per requirement	
4	**Semiconductor Devices:** Overview of Semiconductors – symbol, construction ,basic principle, operation, and characteristics and applications of PN-junction diode, Zener diode,	**07**

	BJT, JFET MOSFET	
	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	**Biploar 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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