

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

AR25

PROGRAM STRUCTURE

and

FIRST AND SECOND YEAR SYLLABUS

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

For CBCS BASED B. TECH – FOUR YEAR PROGRAM
(Applicable from AY 2025-26)



Geethanjali College of Engineering and Technology
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with A+ Grade)
Sy. No: 33 & 34, Cheeryal (V), Keesara (M), Medchal District, Telangana – 501301

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Vision of the Institute:

To be an epicenter, promoting scholarly activities, fostering innovation, research, and entrepreneurship, leading sustainable societal development

Mission of the Institute:

- To solve complex societal problems, inculcating critical thinking and problem-solving skills.
- To inculcate creativity and innovation, developing a culture of research and entrepreneurship.
- To preserve and promote cultural heritage, humanistic and spiritual values, promoting peace and harmony in society.

Vision of the Department:

To be a premier Center of Excellence in Electronics and Communication Engineering, promoting quality education, research, and innovation, fostering technically competent, socially responsible, and ethically driven professionals contributing to sustainable societal development.

Mission of the Department:

- **M1:** To impart strong theoretical foundation with practical exposure in Electronics and Communication Engineering through enriched curriculum, facilitating development of critical thinking and problem-solving skills to solve complex engineering and societal problems.
- **M2:** To foster an innovative culture, nurturing research abilities through interdisciplinary projects, emerging technologies, with an entrepreneurial mind-set.
- **M3:** To promote ethical values, professionalism, and cultural sensitivity, encouraging lifelong learning, teamwork, and responsible citizenship for global harmony and peace.

Program Educational Objectives (PEOs):

- **PEO1:** Facilitate students towards gainful employment or higher education through a strong curriculum by demonstrating technical competence, innovation, research aptitude, and entrepreneurial skills in emerging areas of electronics and communication engineering.
- **PEO2:** Apply fundamental knowledge of electronics, communication engineering, mathematics, and sciences to analyze and solve complex engineering and societal problems.
- **PEO3:** Demonstrate professional integrity, collaborative and leadership capabilities, and effective interpersonal skills in engineering practice, while addressing societal and environmental challenges through sustainable and responsible solutions.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Knowledge and Attitude Profile (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Program Outcomes (POs)

- PO1 Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2 Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
- PO3 Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5).
- PO4 Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

- PO5 Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
- PO6 The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7 Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).
- PO8 Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9 Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
- PO10 Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11 Life-Long Learning:** Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).

Program Specific Outcomes (PSOs)

1. An ability to design an Electronics and Communication Engineering system, component, or process and conduct experiments, analyze, interpret data and prepare a report with conclusions to meet desired needs within the realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
2. An ability to use modern Electronic Design Automation (EDA) tools, software and electronic equipment to analyze, synthesize and evaluate Electronics and Communication Engineering systems for multidisciplinary tasks.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

B. TECH ELECTRONICS AND COMMUNICATION ENGINEERING

Academic Regulations: AR25

Academic Year 2025-26

PROGRAMME STRUCTURE

FIRST YEAR I – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25MA11001	Matrices and Calculus	BSC	3	1	0	40	60	100	4
2	25CH11001	Engineering Chemistry	BSC	3	0	0	40	60	100	3
3	25CS11001	Programming for Problem Solving	ESC	2	0	0	40	60	100	2
4	25EE11001	Basic Electrical Engineering	ESC	3	0	0	40	60	100	3
5	25ME11001	Engineering Drawing and Computer Aided Drafting	ESC	2	0	2	40	60	100	3
6	25EN11001	English for Skill Enhancement	HSMC	3	0	0	40	60	100	3
7	25CH11L01	Engineering Chemistry Laboratory	BSC	0	0	2	40	60	100	1
8	25CS11L01	Programming for Problem Solving Laboratory	ESC	0	0	2	40	60	100	1
9	25EN11L01	English Language and Communication Skills Laboratory	HSMC	0	0	2	40	60	100	1
10	25EE11L01	Basic Electrical Engineering Laboratory	ESC	0	0	2	40	60	100	1
		Induction Program								
Total				16	1	10	400	600	1000	22
Total Number of Hours Per Week				27						

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

FIRST YEAR II – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25MA12001	Ordinary Differential Equations and Vector Calculus	BSC	3	0	0	40	60	100	3
2	25PH12001	Advanced Engineering Physics	BSC	3	0	0	40	60	100	3
3	25EC12001	Electronic Devices and Circuits	PCC	3	0	0	40	60	100	3
4	25CS12001	Data Structures	ESC	3	0	0	40	60	100	3
5	25MS12001	Innovation and Entrepreneurship	HSMC	2	0	0	40	60	100	2
6	25PH12L01	Advanced Engineering Physics Laboratory	BSC	0	0	2	40	60	100	1
7	25EC12L01	Electronic Devices and Circuits Laboratory	PCC	0	0	2	40	60	100	1
8	25CS12L01	Data Structures Laboratory	ESC	0	0	2	40	60	100	1
9	25ME12L01	Engineering Workshop	ESC	0	0	2	40	60	100	1
Total				14	0	8	360	540	900	18
Total Number of Hours Per Week				22						

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

SECOND YEAR I – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25MA21001	Numerical Methods and Complex Variables	BSC	3	0	0	40	60	100	3
2	25EC21001	Signals and Systems	PCC	3	0	0	40	60	100	3
3	25EC21002	Digital Logic Design	PCC	3	0	0	40	60	100	3
4	25EC21003	Electronic Circuit Analysis	PCC	3	0	0	40	60	100	3
5	25EC21004	Network Analysis and Synthesis	PCC	3	0	0	40	60	100	3
6	25MA21L01	Computational Mathematics Lab	BSC	0	0	2	40	60	100	1
7	25EC21L01	Digital Logic Design Laboratory	PCC	0	0	2	40	60	100	1
8	25EC21L02	Electronic Circuit Analysis Laboratory	PCC	0	0	2	40	60	100	1
9	25CE21VA1	Environmental Science	VAC	1	0	0	40	60	100	1
10	25CS21SD5	Skill Development Course-1 Linux and Shell Scripting	SDC	0	0	2	40	60	100	1
Total				16	0	8	400	600	1000	20
Total Number of Hours Per Week				24						

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

SECOND YEAR II – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25EC22001	Analog and Digital Communications	PCC	3	0	0	40	60	100	3
2	25EC22002	Linear and Digital IC Applications	PCC	3	0	0	40	60	100	3
3	25EC22003	Probability Theory and Stochastic Processes	PCC	3	0	0	40	60	100	3
4	25EC22004	Electromagnetic Fields and Transmission Lines	PCC	3	0	0	40	60	100	3
5	25EC22005	Control Systems	PCC	2	0	0	40	60	100	2
6	25CS22007	Python Programming	ESC	3	0	0	40	60	100	3
7	25EC22L01	Analog and Digital Communications Laboratory	PCC	0	0	2	40	60	100	1
8	25EC22L02	Linear and Digital IC Applications Lab	PCC	0	0	2	40	60	100	1
9	25EC22L03	Modelling and Simulation Laboratory	PCC	0	0	2	40	60	100	1
10	25CS22L07	Python Programming Laboratory	ESC	0	0	2	40	60	100	1
11	25CS22SD6	Skill Development Course – 2 Web and Mobile Applications	SDC	0	0	2	40	60	100	1
Total				17	0	10	440	660	1100	22
Total Number of Hours Per Week				27						

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

THIRD YEAR I – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credit
				L	T	P/D	CI	SE	Total	
1	25EC31001	RISC and Microcontroller architectures	PCC	3	0	0	40	60	100	3
2	25EC31002	Digital Signal Processing	PCC	3	0	0	40	60	100	3
3	25EC31003	CMOS VLSI Design	PCC	3	0	0	40	60	100	3
	Professional Elective - I									
4	25EC31004	Cellular and Mobile Applications	PEC	3	0	0	40	60	100	3
	25EC31005	CMOS Fabrication and Technology								
	25EC31006	Data Communications and Computer Networks								
	25EC31007	Computer Organization and Operating Systems								
	Open Elective-I									
5	25CE31101	Building Science and Technology	OEC	2	0	0	40	60	100	2
	25CS31102	Introduction to Operating Systems								
	25CS31103	Principles of Programming Languages								
	25AI31104	Fundamentals of Artificial Intelligence								
	25AI31105	Agentic Artificial Intelligence								
	25CY31106	Cyber Security								
	25CY31107	Ethical Hacking Fundamentals								
	25DS31108	R Programming								
	25DS31109	Data Engineering								
	25EE31110	Fundamentals of Electric Vehicles								
	25ME31112	Industrial Robotics								
	25MS31113	Intellectual Property Rights								
	25MA31114	Logical Reasoning I								
6	25EC31L01	RISC and Microcontroller Interfacing Laboratory	PCC	0	0	2	40	60	100	1

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

7	25EC31L02	CMOS VLSI Design Laboratory	PCC	0	0	2	40	60	100	1
8	25EC31L03	Digital Signal Processing Laboratory	PCC	0	0	2	40	60	100	1
9	25EC31008	Field-based Research Project/ Internship	PROJ	0	0	4	0	100	100	2
10	25EC31SD1	Skill Development Course – 3: FPGA-based System Design	SDC	0	0	2	40	60	100	1
11	25EN31VA2	Indian Knowledge System – Vedic Maths	VAC	1	0	0	40	60	100	1
				15	0	12	400	700	1100	21
Total Number of Hours Per Week				27						

THIRD YEAR II – SEMESTER

S. No	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1	25MS32002	Business Economics and Financial Analysis	HSMC	3	0	0	40	60	100	3
2	25EC32001	IoT Architectures and Protocols	PCC	3	0	0	40	60	100	3
3	25EC32002	Antenna Design and Wave Propagation	PCC	3	0	0	40	60	100	3
Professional Elective – II										
4	25EC32003	5G Communications	PEC	3	0	0	40	60	100	3
	25EC32004	Electronic Measurements and Instrumentation								
	25EC32005	Low Power VLSI Design								
	25EC32006	Image and Video Processing								
Open Elective-II										
5	25CE32201	Building Services Engineering	OEC	2	0	0	40	60	100	2
	25CS32202	Introduction to Computer Networks								
	25CS32203	Modern Databases								
	25AI32204	Introduction to Natural Language								

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

		Processing								
	25AI32205	Fundamentals of Fuzzy Logic								
	25CY32206	Social Media Security								
	25CY32207	Information System Audit and Assurance								
	25DS32208	MERN Stack Development								
	25DS32209	Web Social Media Analytics								
	25EE32210	Digital Energy								
	25ME32212	Non-Conventional Sources of Energy								
	25MS32213	Supply chain management								
	25MA32214	Logical Reasoning II								
6	25EC32L01	Advanced Communications Laboratory	PCC	0	0	2	40	60	100	1
7	25EC32L02	IoT Architectures and Protocols Laboratory	PCC	0	0	2	40	60	100	1
8	25EC32L03	VLSI Design Verification Laboratory	PCC	0	0	2	40	60	100	1
9	25EN32L01	English for Employability Skills Laboratory	HSMC	0	0	2	40	60	100	1
10	25EC32SD2	Skill Development Course – 4: 5G Practical Laboratory / Robotic Laboratory /Drone Laboratory	SDC	0	0	2	40	60	100	1
11	25MS32VA3	Gender Sensitization / Human Values and Professional Ethics*	VAC	1	0	0	40	60	100	1
Total				15	0	10	440	660	1100	20
Total Number of Hours Per Week				25						

*Note: For the courses Gender Sensitization and Human Values and Professional Ethics - One hour of instruction will be conducted on alternate weeks. For example, if a one-hour class for Gender Sensitization Lab is conducted this week, then a one-hour class for Human Values and Professional Ethics will be conducted in the following week.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

FOURTH YEAR I – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25MS41003	Fundamentals of Management for Engineers	HSM C	3	0	0	40	60	100	3
2	25EC41001	Microwave and Optical Communications	PCC	3	0	0	40	60	100	3
3	25EC41002	Embedded System Design	PCC	3	0	0	40	60	100	3
Professional Elective - III										
4	25EC41003	Biomedical Signal and Image Processing	PEC	3	0	0	40	60	100	3
	25EC41004	Wireless Communication Networks								
	25EC41005	Design for Testability								
	25EC41006	Unmanned Aerial Vehicles and Satellite Imaging								
Professional Elective - IV										
5	25EC41007	Artificial Neural Networks and Deep Learning	PEC	3	0	0	40	60	100	3
	25EC41008	Satellite Communications								
	25EC41009	Analog and Mixed Signal IC Design								
	25EC41010	Biomedical Instrumentation								
Open Elective-III										
6	25CE41301	Disaster Management	OEC	2	0	0	40	60	100	2
	25CS41302	Algorithm Design								
	25CS41303	Fundamentals of Cyber Security								
	25AI41304	Chatbots								
	25AI41305	Conservational Artificial Intelligence								
	25CY41306	Data Privacy								
	25CY41307	Security Incident and Response Management								
	25DS41308	Android Application Development								
	25DS41309	Data Stream processing								

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

		using Spark								
	25EE41310	Sustainable Energy								
	25ME41312	Digital Manufacturing								
	25MS41313	Project management and finance								
	25MA41314	Mathematics in India from Vedic Period to Modern Times								
7	25EC41L01	Microwave and Optical Communications Laboratory	PCC	0	0	2	40	60	100	1
8	25EC41L02	Embedded System Design Laboratory	PCC	0	0	2	40	60	100	1
9	25EC41011	Industry Oriented Mini Project/ Summer Internship	PROJ	0	0	4	0	100	100	2
Total				17	0	8	320	580	900	21
Total Number of Hours Per Week				25						

FOURTH YEAR II – SEMESTER

S. No.	Course Code	Course	Course Category	Number of Hours/ Week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
	Professional Elective - V									
1	25EC42001	AI for Signal and Image Processing	PEC	3	0	0	40	60	100	3
	25EC42002	Radar Systems								
	25EC42003	Intelligent e -computer Aided Design								
	25EC42004	Network Security and Cryptography								
	Professional Elective - VI									
2	25EC42005	DSP Processors and Architectures	PEC	3	0	0	40	60	100	3
	25EC42006	Quantum Technologies								
	25EC42007	RF Circuit Design								
	25EC42008	Model Based System Engineering								
3	20EC42009	Project Work	PROJ	0	0	28	40	60	100	14
Total				6	0	28	120	180	300	20
Total Number of Hours Per Week				34						

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

**B. Tech. ELECTRONICS AND COMMUNICATION ENGINEERING
AR25 STRUCTURE FOR UNDERGRADUATE PROGRAM**

S.No	Category/ Semester	Credits as per AICTE Model Curriculum	Credits as per AR25
1.	Humanities and Social Sciences including Management	15	13
2.	Basic Sciences	23	19
3.	Engineering Sciences including workshop, drawing, basics of electrical/mechanical/computer etc.	17	19
4.	Professional Core Courses	61	64
5.	Professional Elective Courses: Courses relevant to chosen specialization/branch	12	18
6.	Open Elective Courses: Electives from other technical and /or emerging subjects	12	6
7.	Project work, seminar, and internship in industry or elsewhere.	20	18
8.	Other Courses: [Induction Program, Value Added Courses, Skill Development Courses.	-	7
	Total	160	164

Course code and definition

S.No.	Category Abbreviation	Description
1.	PCC	Professional Core Courses
2.	PEC	Professional Elective Courses
3.	PROJ	Field based research Project, Internship, Industry oriented Mini Project, Summer internship and Project work
4.	BSC	Basic Science Courses
5.	ESC	Engineering Science Courses
6.	HSMC	Humanities and Social Sciences including Management Courses
7.	OEC	Open Elective Courses
8.	VAC	Value Added Courses
9.	SDC	Skill Development Courses

Definition of credit

S. No.	Abbreviation	Credits	Description
1.	L	1	1 Hr. Lecture (L) per week
2.	T	1	1 Hr. Tutorial (T) per week
3.	P	1	2 Hours Practical(Lab)/week

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

OPEN ELECTIVES FOR ECE

OPEN ELECTIVES offered by a department SHOULD NOT be taken by the students of the same department.

Open Elective - I		
S. No.	Name of the Course	Course Code
1	Building Science and Technology	25CE31101
2	Introduction to Operating Systems	25CS31102
3	Principles of Programming Languages	25CS31103
4	Fundamentals of Artificial Intelligence	25AI31104
5	Agentic Artificial Intelligence	25AI31105
6	Cyber Security	25CY31106
7	Ethical Hacking Fundamentals	25CY31107
8	R Programming	25DS31108
9	Data Engineering	25DS31109
10	Fundamentals of Electric Vehicles	25EE31110
11	Principles of Communication Systems	25EC31111
12	Industrial Robotics	25ME31112
13	Intellectual Property Rights	25MS31113
14	Logical Reasoning 1	25MA31114

Open Elective - II		
S. No.	Name of the Course	Course Code
1	Building Services Engineering	25CE32201
2	Introduction to Computer Networks	25CS32202
3	Modern Databases	25CS32203
4	Introduction to Natural Language Processing	25AI32204
5	Fundamentals of Fuzzy Logic	25AI32205
6	Social Media Security	25CY32206
7	Information System Audit and Assurance	25CY32207
8	MERN Stack Development	25DS32208
9	Web Social Media Analytics	25DS32209
10	Digital Energy	25EE32210
11	Introduction to Sensors and Instrumentation	25EC32211
12	Non-Conventional Sources of Energy	25ME32212
13	Supply chain management	25MS32213
14	Logical Reasoning II	25MA32214

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Open Elective - III		
S. No.	Name of the Course	Course Code
1	Disaster Management	25CE41301
2	Fundamentals of Cyber Security	25CS41302
3	Chatbots	25CS41303
4	Data Privacy	25AI41304
5	Android Application Development	25AI41305
6	Data Privacy	25CY41306
7	Security Incident and Response Management	25CY41307
8	Android Application Development	25DS42308
9	Data Stream Processing using Spark	25DS42309
10	Sustainable Energy	25EE41310
11	Electronics for Health Care	25EC41311
12	Digital Manufacturing	25ME41312
13	Project management and finance	25MS41313
14	Mathematics in India from Vedic Period to Modern Times	25MA41314

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25MA11001 – Matrices and Calculus

B. Tech. ECE – I Year I Sem.

Prerequisite(s): None

L	T	P/D	C
3	1	-/-	4

Course Objectives: Develop ability to

1. Understand various types of matrices, properties and rank of the matrix to find the solution for system of equations, if it exists.
2. Apply the knowledge of eigen values and eigenvectors of a matrix from quadratic form into a canonical form through linear and orthogonal transformations.
3. Familiarize students with the statements, geometrical interpretations, and applications of Mean Value Theorems such as Rolle's Theorem, Lagrange's Mean Value Theorem, and Cauchy's Mean Value Theorem.
4. Compute partial derivatives, composite functions of several variables and apply the methods of differential calculus to optimize multivariable functions
5. Evaluate definite integrals to calculate surface and volume of revolutions of curves, multiple integrals and apply the same to solve engineering problems.

Course outcomes (COs): At the end of the course, students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Apply elementary transformations to solve a system of linear equations and reduce the quadratic form to the canonical form using linear and / or orthogonal transformation.	PO1, PO2, PO3 and PSO 1	I & II	4	4, 9
CO2	Apply Mean Value Theorems to analyze the behaviour of functions, interpret their geometrical meaning, and solve related problems in mathematical and engineering contexts.	PO1, PO2, PO3 and PSO 1	III	4	
CO3	Apply the concept of partial differentiation to solve constrained optimization problems without graphical representation	PO1, PO2, PO3 and PSO 1	IV	4	
CO4	Apply the definite / multiple integrals to compute areas and volumes of any region / solids	PO1, PO2, PO3 and PSO 1	V	4	

UNIT-I:

Matrices

8 L

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method.

System of linear equations: Solving System of Homogeneous and Non-Homogeneous equations, Gauss Seidel Iteration Method.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-II:

Eigenvalues and Eigenvectors

10 L

Linear Transformation and Orthogonal Transformation: Eigenvalues and eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic forms, Reduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT-III:

Single Variable Calculus:

10 L

Limits and Continuity of Functions and their properties, Mean Value Theorems – Rolle's Theorem, Lagrange's Mean Value Theorem with their geometrical interpretation and applications, Cauchy's mean Value Theorem, Taylor's Series (All the theorems without proof)

UNIT-IV:

Multivariable Calculus (Partial Differentiation and applications)

10 L

Definitions of Limit and Continuity, Partial Differentiation, Euler's Theorem, Total derivative, Jacobian, Functional dependence and independence.

Applications: Maxima and Minima of functions of two variables and three variables using method of Lagrange multiplier.

Improper Integrals: Beta and Gamma Functions and their applications without proofs.

UNIT-V:

Multivariable Calculus (Integration)

10 L

Evaluation of Double Integrals (Cartesian and polar coordinates), Change of order of integration (only Cartesian form), Change of variables for double integrals (Cartesian to polar),

Evaluation of Triple Integrals: Change of Variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates).

Applications: Areas by double integrals and volumes by double integrals and triple integrals.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2011.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2002,
3. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Edition, 2015.
4. H.K. Das and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Ltd, New Delhi.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CH11001– Engineering Chemistry

B. Tech. ECE - I Year I Sem.

Prerequisite(s): None.

Course Objectives: Develop an ability to

1. Acquire knowledge of various water treatment methods and their industrial significance in resolving the problem of water hardness.
2. Understand fundamental principles of electrochemistry and corrosion with a perspective of their industrial applications.
3. Impart fundamental knowledge of various energy sources and their practical applications in engineering.
4. Understand the various aspects of polymers, including conducting and biodegradable polymers, and their applications in diverse fields.
5. Acquire knowledge of materials such as cement, lubricants, and biosensors, as well as spectroscopic techniques applicable in engineering, industrial and biomedical fields.

Course Outcomes: At the end of the course, students would be able to

L	T	P/D	C
3	-	-/-	3

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Predict problems associated with hardness of water and identify appropriate methods to treat hardness.	PO1, PO2	I	3	3,6,7,8, 12
CO2	Analyze different electrodes and corrosion control methods for interpreting their applications in various sectors.	PO1, PO2	II	4	
CO3	Comprehend the usage of batteries, fuel cells and various energy sources, enhancing their potential as future engineers and entrepreneurs.	PO1, PO2	III	3	
CO4	Categorize polymers and their applications in different fields.	PO1, PO2	IV	3	
CO5	Apply knowledge of engineering materials and principles of spectroscopic techniques to support industrial and biomedical applications	PO1, PO2	V	3	

UNIT-I:

Water and its treatment

Introduction- Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break-point chlorination. Defluoridation - Nalgonda technique.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning and Phosphate conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.

Unit-II:

Electrochemistry and Corrosion

Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of reference electrodes – Quinhydrone and Calomel electrode. Construction, working and determination of pH of an unknown solution using Quinhydrone and Calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods. Metallic coatings-Methods of application - Galvanizing and Tinning.

UNIT-III:

Energy sources

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Lead – acid storage battery and Lithium-ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulong's formula - Numerical problems.

Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil, LPG and CNG composition and uses.

Synthetic Fuels: Fischer-Tropsch process. Introduction and applications of Hythane and Green Hydrogen.

UNIT-IV:

Polymers

Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerizations - Addition (free radical addition mechanism) and condensation polymerization. Plastics, Elastomers and Fibers: Definition and applications (PVC, Teflon, Nylon-6,6). Differences between thermoplastics and thermo setting plastics.

Conducting polymers: Definition and Classification with examples - Mechanism of conduction in trans-poly-acetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V:

Engineering Materials and their applications

Cement: Portland cement, its composition, setting and hardening.

Lubricants: Definition and characteristics of a good lubricant.

Properties of lubricants- viscosity, cloud and pour point, flash and fire point.

Biosensor - Definition, Amperometric Glucose monitor sensor.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Spectroscopic techniques and applications: UV-Visible spectroscopy- Principle, Selection rules, Types of electronic transitions and applications (Analysis of pollutants in dye industry); IR spectroscopy-Principle- Mode of vibrations, Applications in night vision-security, Pollution under Control- CO sensor (Passive Infrared detection),

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi, Dr.P. Aparna and Rath, Cengage learning, 2025.

REFERENCE TEXT BOOKS:

1. Engineering Chemistry by Thirumala Chary, Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by **Editors:** Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. Raman Spectroscopy in Human Health and Biomedicine,
7. E-Content- <https://doi.org/10.1142/13094> | October 2023
8. E-books:
<https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2up>
<https://www.worldscientific.com/doi/epdf/10.1142/13094>

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS11001: Programming for Problem Solving

B. Tech. ECE– I Year I Sem.

Prerequisite(s): None

L	T	P/D	C
2	-	-/-	2

Course Objectives: Develop ability

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.

Course outcomes (COs): At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Develop algorithms and flowcharts to solve problems and implement them using C programs.	PO1, PO2, PO3, PO12, PSO1, PSO2	I	3	4,9
CO2	Apply control structures and iterative statements to solve real-world problems using C.	PO1, PO2, PO3, PO4, PO5, PO10, PO12, PSO1, PSO2	II	3	4,8
CO3	Design modular programs using functions, recursion, and preprocessor directives.	PO1, PO2, PO3, PO12, PSO1, PSO2	III	4	9,12
CO4	Implement and analyze searching and sorting algorithms using arrays in C.	PO1, PO2, PO3, PO4, PO5, PO10, PO12, PSO1, PSO2	IV	4	4,9
CO5	Utilize pointers and strings for dynamic memory management and efficient program design.	PO1, PO2, PO3, PO4, PO5, PO10, PO12, PSO1, PSO2	V	4	8,9

UNIT-I:

Logic Building: Flow chart, Algorithm, Pseudo code. Introduction to Programming Computer Languages, Creating and running programs, Program Development. Introduction to the C Language Background, C Programs, Identifiers, Data Types, Variables, Constants, Input/output functions. Operators Arithmetic, relational, logical, bitwise, conditional, increment/decrement, assignment. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.

UNIT-II:

Control statements: Selection Statements (decision making) – if and switch statements. Repetition statements (loops) while, for, do-while statements. Break, continue, goto statements.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-III:

Functions and Program structure: User defined functions, inter function communication, Scope and Lifetime of variables, Storage classes-auto, register, static, extern, type qualifiers. The C preprocessor. Recursive functions.

UNIT-IV:

Arrays: Declaring and Referencing Arrays, Array Subscripts, Using Array Elements as Function Arguments, Array Arguments, Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms two – dimensional arrays matrix addition and matrix multiplication, Declaration of Multidimensional arrays.

UNIT-V:

Pointers: Introduction, Pointers and addresses, Pointer types, Pointers and function arguments, Pointers and arrays, address arithmetic, Array of Pointers, Pointers to Pointers, Pointer to Function, pointers and multi-dimensional arrays. Dynamic Memory Allocation.

Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, character pointers and functions

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
3. Yashvant Kanetkar, Let Us C, 18th Edition, BPB.
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EE11001– Basic Electrical Engineering

(Common to CSE, CSE (AIML), CSE (CS), CSE (DS), and ECE)

B. Tech. ECE I Year I Sem

Prerequisite(s): None

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop an ability to

1. Provide a strong foundation in electrical engineering concepts to enable students to analyze and solve DC and AC electrical circuits.
2. Understand the construction, working principles, and characteristics of electrical machines.
3. Evaluate the performance of electrical machines through experimental, analytical, and simulation-based approaches.
4. Familiarize with electrical installation practices, wiring systems, and safety measures essential for professional engineering applications.
5. Promote teamwork, critical thinking, and problem-solving skills through problem/project-based learning activities relevant to real-world electrical systems.

Course outcomes (COs): At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Analyze DC and AC electrical circuits using basic laws, theorems, and phasor concepts.	PO1, PO2, PO4, PO5, PO11 & PSO1	I & II	4	7, 9
CO2	Explain the construction, operation, and performance of transformers and electrical machines.	PO1, PO2, PO3, PO5, PO11 & PSO2	III & IV	2	7, 9
CO3	Evaluate performance of various DC and AC machines.	PO1, PO2, PO4, PO5, PO11 & PSO2	IV	5	7, 12
CO4	Apply principles of electrical installations, wiring systems, and safe practices in engineering applications.	PO1, PO2, PO3, PO5, PO11 & PSO3	V	3	3, 7, 11

UNIT-I:

D.C. Circuit Analysis: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Transient response of first-order RL and RC circuits (with DC excitation).

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-II:

A.C. Circuit Analysis: Representation of sinusoidal waveforms; determination of average and RMS values; phasor representation. Computation of real, reactive, and apparent power; analysis of power factor. Analysis of single-phase AC circuits and Resonance in series R–L–C Circuit.

UNIT-III:

Transformer: Ideal and practical transformer, equivalent circuit, losses and efficiency in transformers. Auto-transformer and Fundamentals of three-phase transformer connections. Applications of transformers.

UNIT-IV:

Electrical Machines: DC machines – construction, working principle and Applications; Three-Phase Induction Motor – generation of rotating magnetic field, construction, operation and its applications. Single-Phase Induction Motor – construction and operation.

UNIT-V:

Electrical Installations: Components of LT switchgear – Types of Fuses, MCB, ELCB, MCCB; types of wires and cables; earthing methods. Batteries – types and key characteristics. Basic energy consumption calculations. Applications of installations.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021.
4. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
5. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25ME11001-Engineering Drawing and Computer Aided Drafting

L	T	P	C
2	-	2	3

B.Tech. ECE I Year I Sem.

Prerequisite(s): None

Course Objectives:

1. To introduce the fundamentals of engineering drawing and projection systems.
2. To develop skills in constructing orthographic, isometric, and sectional views.
3. To train students in interpreting and creating technical drawings using CAD tools.
4. To familiarize students with dimensioning standards and drafting conventions.
5. To bridge manual drafting techniques with computer-aided drafting practices.

Course Outcomes: At the end of the course, the students would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	SDGs
CO1	Understand and apply the concepts of Auto-CAD commands to practice Engineering Drawing.	PO1, PO3, PO9 PSOs: Nil	I, II, III, IV and V	5	4, 9, 11
CO2	Construct scales, Geometric curves (Conic sections & Cylindrical curves) by using Auto- CAD.	PO1, PO3, PO9 PSOs: Nil	I	5	
CO3	Apply the principles of Orthographic projections to draw points, Straight lines, Planes and regular solids by using Auto-CAD.	PO1, PO3, PO9 PSOs: Nil	II, III	5	
CO4	Develop the sectional views and surfaces of a solid Geometries by using Auto-CAD.	PO1, PO3, PO9 PSOs: Nil	IV	5	
CO5	Demonstrate drafting skills for Isometric and Orthographic views.	PO1, PO3, PO9, PSOs: Nil	V	5	

UNIT-I:

Introduction to Engineering Graphics (Conventional)

Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.

UNIT -II:

Orthographic Projections (Conventional and Computer Aided)

Introduction to Computer aided drafting, views, and commands.

Principles of Orthographic Projections, Conventions, Projections of Points and Lines (Lines Inclined to both the Planes).

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-III:

Projections of Regular Planes and Solids (Conventional and Computer Aided)

Projections of Plane regular geometric figures. Computer aided orthographic projections of planes (Planes inclined to both the planes).

Right Regular Solids (Axis inclined to one plane)-Prism, Cylinder, Pyramid, Cone, Computer aided projections of planes & solids.

UNIT-IV: Sections of Solids and Development of Surfaces (Conventional)

Sectional views and development surfaces of Prism, Cylinder, Pyramid and Cone.

UNIT-V: Isometric Projections (Conventional and Computer Aided)

Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple and Compound Solids. Conversion of Isometric Views to Orthographic Views and Vice- versa.

Note:

1. The End Semester Examination will be in computer mode.
2. CIE – I will be in conventional/ computer mode.
3. CIE – II will be in computer mode.

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, Charotar, 54th Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and company Ltd., 3rd Edition, 2010.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3rd Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3rd Edition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2nd Edition, 2009.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1st Edition, 2015.
5. Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2nd Edition, 2015.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EN11001 –English for Skill Enhancement

B. Tech. ECE - I Year I Sem

Prerequisite(s): None

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop an ability to

1. Improve vocabulary.
2. Use appropriate sentence structures in oral and written communication.
3. Strengthen reading comprehension and independent study skills.
4. Write paragraphs, essays, and précis and draft letters.
5. Write technical reports

Course Outcomes: At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Infer and use appropriate vocabulary in oral and written communication.	PO8, PO9 PSOs: Nil	I, II, III, IV & V	5	4
CO2	Apply the rules of functional grammar and sentence structures in communication.	PO8, PO9 PSOs: Nil	I, II, III, IV & V	5	
CO3	Comprehend any given text and respond precisely.	PO8, PO9 PSOs: Nil	I, II, III, IV & V	5	
CO4	Construct meaningful and explicit sentences in written form befitting the context.	PO8, PO9 PSOs: Nil	I, II, III, IV & V	5	

UNIT-I:

Theme: Perspectives

Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Words often Misspelt - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions — Degrees of Comparison

Reading: Reading and Its Importance- Sub Skills of Reading – Skimming and Scanning.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing Precisely –Nature and Style of Formal Writing.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-II:

- Theme:** **Digital Transformation**
Lesson on 'Emerging Technologies' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.
- Vocabulary:** Homophones, Homonyms and Homographs
- Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
- Reading:** Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice
- Writing:** Paragraph Writing — Types, Structures and Features of a Paragraph - Creating Coherence — Linkers and Connectives - Organizing Principles in a Paragraph — Defining- Describing People, Objects, Places and Events — Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

UNIT-III:

- Theme:** **Attitude and Gratitude**
Poems on 'Leisure' by William Henry Davies and 'Be Thankful' - Unknown Author from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.
- Vocabulary:** Words Often Confused - Words from Foreign Languages and their use in English.
- Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
- Reading:** Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.
- Writing:** Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.

UNIT-IV:

- Theme:** **Entrepreneurship**
Lesson on 'Why a Start-Up Needs to Find its Customers First' by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.
- Vocabulary:** Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs — Idioms.
- Grammar:** Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.
- Reading:** Prompt Engineering Techniques— Comprehending and Generating Appropriate Prompts - Exercises for Practice
- Writing:** Writing Practices- Note Making- Précis Writing.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-V:

Theme: Integrity and Professionalism

Lesson on '*Professional Ethics*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: Technical Vocabulary and their Usage– One Word Substitutes – Collocations.

Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice

Writing: *Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.*

TEXT BOOK:

1. Board of Editors. 2025. *English for the Young in the Digital World*. Orient Black Swan Pvt. Ltd.

REFERENCE BOOK(S):

1. Swan, Michael. (2016). *Practical English Usage*. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. *English Grammar Just for You*. Oxford University Press. New Delhi
3. 2024. *Empowering with Language: Communicative English for Undergraduates*. Cengage Learning India Pvt. Ltd. New Delhi
4. Sanjay Kumar & Pushp Lata. 2022. *Communication Skills – A Workbook*. Oxford University Press. New Delhi
5. Wood, F.T. (2007). *Remedial English Grammar*. Macmillan.
6. Vishwamohan, Aysha. (2013). *English for Technical Communication for Engineering Students*. Mc Graw-Hill Education India Pvt. Ltd.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CH11L01– Engineering Chemistry Laboratory

B. Tech. ECE - I Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives: Develop an ability to

1. Estimate the hardness content in water and check its suitability for drinking purpose.
2. Acquire ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
3. Gain hands-on experience in synthesizing polymers like Bakelite and Nylon – 6, 6 in the laboratory.
4. Measure physical properties like acid value and viscosity.
5. Gain conceptual understanding of experiments involving core chemical principles through virtual platforms, with relevance to engineering applications.

Course outcomes: At the end of the course, the students would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Estimate hardness in water to verify its suitability for drinking purpose.	PO1, PO2	1	4	3,6,7,8, 12
CO2	Apply instrumental techniques like conductometry, potentiometry, and pH metry.	PO1, PO2	2,3,4,5,6	4	
CO3	Use fundamental preparatory techniques for the synthesis of polymers such as Bakelite and Nylon-6,6.	PO1, PO2	7,8	4	
CO4	Determine physical properties, namely acid value and viscosity of a given fluid.	PO1, PO2	10, 11	2	
CO5	Demonstrate the ability to analyze and interpret virtual experiments based on fundamental chemical principles applicable to engineering systems.	PO1, PO2	12,13,14,15	2	

List of Experiments: (A minimum of TEN Experiments are to be conducted using hardware)

1. Estimation of Hardness of water by EDTA Complexometric method.
2. Estimation of the concentration of strong acid by Conductometry.
3. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.
4. Estimation of concentration of Fe^{+2} ion by Potentiometry using KMnO_4 .
5. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

6. Determination of an acid concentration using pH meter.
7. Preparation of Bakelite.
8. Preparation Nylon – 6, 6.
9. Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
10. Estimation of acid value of given lubricant oil.
11. Estimation of viscosity of lubricant oil using Ostwald's Viscometer.
12. Construction of Fuel cell and it's working.
13. Smart materials for Biomedical applications
14. Batteries for electrical vehicles.
15. Functioning of solar cell and its applications.

Equipment required:

1. Potentiometer cum pH meter
2. Conductometer
3. Ostwald's viscometer
4. Electric water bath

Glassware (Burette, Pipette, conical flask, volumetric flask, beaker)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS11L01- Programming for Problem Solving Laboratory

B. Tech. ECE – I Year I Sem.

Prerequisite(s): None

L	T	P/D	C
-	-	2/-	1

Course Objectives: Develop ability to

[Note: The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:

CodeLite: <https://codelite.org/>

Code: Blocks: <http://www.codeblocks.org/>

DevCpp : <http://www.bloodshed.net/devcpp.html>

Eclipse: <http://www.eclipse.org>

This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.

Course outcomes (COs): At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Formulate the algorithms for simple problems	PO1, PO2, PO3, PO5, PSO1, PSO2	I	3	4,9
CO2	Translate given algorithms to a working and correct program	PO1, PO2, PO3, PO5, PSO1, PSO2	I	3	4,8
CO3	Correct syntax errors as reported by the compilers.	PO1, PO2, PO5, PSO1, PSO2	I, II, III, IV, V	4	4
CO4	Identify and correct logical errors encountered during execution	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2	I, II, III, IV, V	3	4,9
CO5	Represent and manipulate data with arrays, strings	PO1, PO2, PO3, PO5, PSO1, PSO2	IV, V	3	4,9
CO6	Use pointers of different types	PO1, PO2, PO3, PO5, PSO1, PSO2	V	3	4,9
CO7	Modularize the code with functions so that they can be reused	PO1, PO2, PO3, PO5, PSO1, PSO2	III	4	4,9

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

PRACTICE SESSIONS:

Simple numeric problems:

- a) Write a program for finding the max and min from the three numbers.
- b) Write the program for the simple, compound interest.
- c) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
- d) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

- a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement).
- b) Write a program that finds if a given number is a prime number.
- c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Arrays, Pointers and Functions:

- a) Write a C program to find the minimum, maximum and average in an array of integers.
- b) Write a C program that uses functions to perform the following: I. Addition of Two Matrices II. Multiplication of Two Matrices
- c) Write a program for reading elements using a pointer into an array and display the values using the array.
- d) Write a program for display values reverse order from an array using a pointer.

Strings:

- a) Write a C program that uses functions to perform the following operations: I. To insert a sub-string into a given main string from a given position. II. To delete n Characters from a given position in a given string
- b) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- c) Write a C program that displays the position of a character ch in the string S or - 1 if S doesn't contain ch.
- d) Write a C program to count the lines, words and characters in a given text.

Sorting and Searching:

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

- a) Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
- b) Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
- c) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- d) Write a C program that sorts the given array of integers using selection sort in descending order
- e) Write a C program that sorts the given array of integers using insertion sort in ascending order
- f) Write a C program that sorts a given array of names.

TEXT BOOKS:

- 1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
- 2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

- 1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- 2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
- 3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
- 4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
- 5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
- 6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
- 7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EN11L01 –English Language and Communication Skills Laboratory

B. Tech. ECE - I Year I Sem.

Prerequisite(s): Nil

L	T	P/D	C
-	-	2/-	1

Course Objectives: Develop an ability to

1. Enhance active listening skills
2. Listen and comprehend the speech of people from different linguistic backgrounds
3. Improve pronunciation and neutralize accent
4. Express ideas fluently and appropriately
5. Speak in social and professional contexts

Course outcomes: At the end of the course, the students would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Exercises	BTL	Related SDGs
CO1	Listen actively and identify important information in spoken texts.	PO8, PO9 PSOs: Nil	I, II, III, IV, V	5	4
CO2	Use Phonetics to neutralize accent and speak intelligibly.	PO8, PO9 PSOs: Nil	I, II, III, IV, V	5	
CO3	Articulate ideas explicitly both verbally and non- verbally	PO8, PO9 PSOs: Nil	I, II, III, IV, V	5	

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

- a. **Computer Assisted Language Learning (CALL) Lab** which focusses on listening skills
- b. **Interactive Communication Skills (ICS) Lab** which focusses on speaking skills

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – I

CALL Lab:

Instruction: Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening

Practice: Listening to Distinguish Speech Sounds (Minimal Pairs) - *Testing Exercises*

ICS Lab:

❖ **Diagnostic Test – Activity titled ‘Express Your View’**

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

Exercise – II

CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Practice: Listening for General Information - Multiple Choice Questions - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Features of Good Conversation – Strategies for Effective Communication

Practice: Role Play Activity - Situational Dialogues –Expressions used in Various Situations –Making Requests and Seeking Permissions — Taking Leave - Telephone Etiquette

Exercise - III

CALL Lab:

Instruction: Errors in Pronunciation – Tips for Neutralizing Mother Tongue Influence (MTI)

Practice: Differences between British and American Pronunciation –Listening Comprehension Exercises

ICS Lab:

Instruction: How to make Formal Presentations, Describing Objects, Situations, Process, Places, People and Events

Practice: Picture Description Activity – Looking at a Picture and Describing Objects, Situations, Places, People and Events (A wide range of Materials / Handouts are to be made available in the lab.) Oral Presentations.

Exercise – IV

CALL Lab:

Instruction: Techniques for *Effective* Listening

*Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises
(It is essential to identify a suitable passage with exercises for practice.)*

ICS Lab:

Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity

Practice: Activity on Telling and Retelling Stories - Collage

Exercise – V

CALL Lab:

Instruction: Identifying the literal and implied meaning

Practice: Listening for Evaluation - Write the Summary – Listening Comprehension Exercises

(It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech - Dumb Charades Activity

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

❖ **Post-Assessment Test on 'Express Your View'**

REFERENCE BOOKS:

1. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
2. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient BlackSwan Pvt. Ltd.
3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press
4. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers*. Cambridge University Press.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EE11L01- Basic Electrical Engineering Laboratory

(Common to CSE, CSE (AIML), CSE (CS), CSE (DS), ECE)

B. Tech. ECE - I Year I Sem

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None.

Course Objectives: Develop an ability to

1. Understand basic electrical laws and network theorems to enable students to analyze DC and AC electrical circuits effectively.
2. Analyze transient behaviour of RLC circuits under different excitation conditions and understand their practical significance in electrical systems.
3. Familiarize students with the construction, operation, and testing of electrical machines and transformers, and enable them to evaluate their performance through suitable experimental methods.

Course outcomes: At the end of the course, the students would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Experiments	BTL	Related SDGs
CO1	Analyze electrical circuits using fundamental laws and theorems	PO1, PO2, PO4 PO5, PO11 & PSO1	1, 2, 3	4	7, 9
CO2	Analyze the transient response of various combinations of R, L and C circuits for different input conditions.	PO1, PO2, PO3, PO5, PO11 & PSO3	4 & 6	4	3, 7, 11
CO3	Evaluate the performance of Electrical Machines and Transformers through various testing methods.	PO1, PO2, PO4, PO5, PO11 & PSO2	7,8,9 & 10	5	7, 12

LIST OF EXPERIMENTS:

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Verification of Superposition theorem
4. Transient response of series RL and RC circuits for DC excitation
5. Resonance in Series RLC circuit
6. Calculations and verification of Impedance and Current of RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Performance Characteristics of a DC Shunt Motor
10. Torque-Speed Characteristics of a Three-phase Induction Motor.

ADDITIONAL EXPERIMENTS:

1. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
2. Measurement of Active and Reactive Power in a balanced Three-phase circuit

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25MA12001 – Ordinary Differential Equations and Vector Calculus

B. Tech. ECE– I Year II Sem.

Prerequisite(s): 25MA11001- Matrices and Calculus

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop ability to

1. Solve first and higher order differential equations of various types.
2. Analyze properties of Laplace Transform, and Inverse Laplace Transform.
3. Solve Ordinary Differential Equations using Laplace Transform techniques.
4. Explain properties of vector operators to determine solenoidal and irrotational vectors, directional derivatives of vectors.
5. Determine the length of a curve, area between the surfaces and volumes of solids using vector integration.

Course Outcomes (COs): At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Form first order differential equations for Growth and Decay and apply appropriate methods for solving them	PO1, PO2, PO3 and PSO 1	I	4	4, 9
CO2	Form higher order differential equations for Electrical circuits and apply appropriate methods for solving them.	PO1, PO2, PO3 and PSO 1	II	4	
CO3	Apply Laplace transform techniques to evaluate integrals and solve ordinary differential equations with initial conditions.	PO1, PO2, PO3 and PSO 1	III	4	
CO4	Analyze and compute vector derivatives and relate vector integrals to physical and engineering applications	PO1, PO2, PO3 and PSO 1	IV & V	4	

UNIT-I:

First Order Ordinary Differential Equations

8 L

Exact Differential Equations, Equations reducible to Exact Differential Equations, Linear Differential Equations and Bernoulli's Equations orthogonal Trajectories (only in Cartesian Coordinates)

Applications: Newton's law of cooling, Law of Natural growth and decay

UNIT-II:

Ordinary Differential Equations of Higher Order

10 L

Higher Order Linear Differential Equations with Constant Coefficients: Non-homogeneous of the type e^{ax} , $\sin ax$, $\cos ax$, x^n , $e^{ax}V(x)$ and $xV(x)$, Method of variation of parameters.

Applications: Electrical Circuits.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-III:

Laplace Transforms

10 L

Definition of Laplace transform, Existence of Laplace transforms, Laplace transform of standard functions, first shifting theorem, Laplace transform of functions when they are multiplied and divided by "t", Laplace transforms of derivatives and integrals of functions, Laplace Transform of Periodic function, Inverse Laplace transform by different methods, Convolution theorem (without proof).

Applications: Evaluation of integrals using Laplace Transforms, Solving Initial Value Problems by using Laplace Transform method.

UNIT-IV:

Vector Differentiation

10 L

Vector point functions and Scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Vector Identities, Scalar potential function, Solenoidal and Irrotational vectors.

UNIT-V:

Vector Integration

10 L

Line, Surface and Volume Integrals. Theorems of Green's Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2011.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Edition, 2015.
4. H.K. Das and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Ltd, New Delhi.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25PH12001- Advanced Engineering Physics

B. Tech. ECE - I Year II Sem.

Prerequisite(s): None

Course Objectives: Develop an ability to

L	T	P/D	C
3	-	-/-	3

1. Understand the fundamental concepts of quantum behavior of matter in its micro state and experimental evidence to dual nature of matter, and physical significance and application of wave function.
2. Understand the characteristics of intrinsic and extrinsic semiconductors, and applications of Hall Effect.
3. Understand the concepts of quantum computing principles, quantum gates, and basic quantum algorithms.
4. Understand the properties and applications of magnetic and dielectric materials.
5. Understand the working and applications of lasers and fibre optics in modern technology.

Course Outcomes: At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Apply quantum mechanical principles to explain particle behavior and energy band formation in solids.	PO1, PO2	I	3	4
CO2	Classify semiconductors, interpret Fermi level variations, and apply Hall effect concept to determine the type of semiconductor.	PO1, PO2	II	3	
CO3	Explain quantum computing concepts, quantum gates, and describe basic quantum algorithms.	PO1, PO2	III	3	
CO4	Classify magnetic and dielectric materials, assess their characteristics, and apply them in technological applications.	PO1, PO2	IV	3	
CO5	Explain principles of lasers and optical fibres, their operation and application in communication and sensing technologies.	PO1, PO2	V	3	

UNIT- I:

Quantum Mechanics

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, formation of energy bands, origin of bandgap, classification of solids, concept of discrete energy levels and quantum confinement in nanomaterials.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-II:

Semiconductors

Classification of semiconductors: n-type, p-type, carrier concentration in intrinsic and extrinsic semiconductors, Fermi level in intrinsic and extrinsic semiconductors, variation of Fermi level with temperature and concentration of dopants in extrinsic semiconductors, direct and indirect band gap semiconductors, Hall effect and its applications.

UNIT-III:

Quantum Computing

Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, Introduction to quantum algorithms: Deutsch-Jozsa, Shor, Grover (Qualitative).

UNIT-IV:

Magnetic and Dielectric Materials

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using sol-gel method, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.

Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT-V:

Laser and Fibre Optics

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO₂ laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.

Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

TEXT BOOKS:

1. Walter Borchardt-Ott, *Crystallography: An Introduction*, Springer.
2. Charles Kittel, *Introduction to Solid State Physics*, John Wiley & Sons, Inc.
3. Thomas G. Wong, *Introduction to Classical and Quantum Computing*, Rooted Grove

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

4. Physics, Halliday, Resnick and Krane, Wiley Publishers, 5th edition, 2018.
5. Engineering Physics, B.K. Pandey, S. Chaturvedi, Cengage Learning, 2012.

REFERENCE BOOKS:

1. Jozef Gruska, *Quantum Computing*, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press.
3. John M. Senior, *Optical Fiber Communications Principles and Practice*, Pearson Education Limited.
4. A Textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar, S. Chand, Revised edition, 2018.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC12001-Electronic Devices and Circuits

(Common to ECE and EEE)

B.Tech. ECE - I Year II Sem.

L	T	P/D	C
3	-	- / -	3

Prerequisite(s): None

Course Objectives: Develop ability to

1. Understand the working principles of semiconductor diodes and their functionality in rectifiers, clippers, and clampers.
2. Understand the operating characteristics of Bipolar Junction Transistors (BJTs) in various configurations.
3. Understand the principles of biasing of BJTs.
4. Understand the low frequency analysis of BJTs using small signal models.
5. Understand the operating characteristics of Field Effect Transistors (FETs), working principles of special purpose diodes, and advanced devices.

Course Outcomes: At the end of the course, the students should be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits.	PO1, PO2, PO3, PO4, PO5, PO6 PSO1	I	4	4
CO2	Evaluate the operation and configurations of BJTs and analyze their input and output characteristics.	PO1, PO2, PO3, PO4, PO5 PSO1	II	4	
CO3	Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.	PO1, PO2, PO3, PO4, PO5 PSO1	III	3	
CO4	Analyze transistor amplifier circuits using h-parameter models and assess their performance for various configurations.	PO1, PO2, PO3, PO4, PO5, PO11 PSO1	IV	4	
CO5	Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare with modern device technologies.	PO1, PO2, PO3, PO4, PO5, PO6, PO11, PSO1	V	4	

UNIT - I:

Diode Characteristics and Applications: PN junction diode – V-I characteristics, Diode resistance and capacitance, Diode models (Ideal, Simplified, Piecewise Linear),

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Rectifiers — Half-wave, Full- wave (Center-tap and bridge), Capacitor filter for rectifiers, Clippers and Clampers, Zener diode – V-I characteristics and voltage regulation.

UNIT - II:

Bipolar Junction Transistor (BJT): Structure and working principle of BJT, Current components and transistor action, Configurations: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

UNIT - III:

BJT Biasing: Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-to-base bias, Voltage divider bias, Stability factors and thermal runaway

UNIT - IV:

BJT Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate CE model – with and without emitter bypass capacitor.

UNIT - V:

Special Purpose Diodes: Principle of Operation of — SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode

Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes — Structure, operation, and characteristics, Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

TEXT BOOKS:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. Tata McGraw-Hill, 1991.
2. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Pearson, 11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed., 2014.

REFERENCE BOOKS:

1. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 5th ed., 2008.
2. Neamen, Donald A. Electronic Circuit Analysis and Design. McGraw-Hill, 2nd ed., 2001.
3. Salivahanan, S., and N. Suresh Kumar. Electronic Devices and Circuits. McGraw-Hill Education, 4th ed., 2017.
4. Razavi, Behzad. Fundamentals of Microelectronics. Wiley, 2nd ed., 2013.
5. Taur, Yuan, and Tak H. Ning. Fundamentals of Modern VLSI Devices. Cambridge University Press, 2nd ed., 2009.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS12001- Data Structures

B. Tech. ECE – I Year II Sem.

Prerequisite(s): Programming for Problem Solving

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop ability to

1. **Introduce students to advanced data representation techniques** in C using structures, unions, enumerations, and typedef to effectively organize and manipulate complex data types.
2. **Proficiency in file handling and data storage concepts**, including text and binary file operations, database searching, file positioning, and multifile program design.
3. **Build foundation in abstract data types and linear data structures**, enabling students to implement and manage linked lists, circular lists, and doubly linked lists for efficient data organization.
4. **Train students in the use of stacks and queues** for solving computational problems such as expression conversion, evaluation, and balancing of symbols through algorithmic thinking.
5. **Equip students with knowledge of hierarchical and network data structures**, including trees and graphs, and their associated algorithms for searching, traversal, and application in problem-solving.

Course outcomes (COs): At the end of the course, the students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Apply user-defined data types such as structures, unions, and enumerations to represent complex data.	PO1, PO2, PSO1	I	3	4
CO2	Implement file operations on text and binary files for data storage, retrieval, and maintenance.	PO2, PO3, PSO2	II	3	9
CO3	Develop and manipulate linear data structures including linked lists, stacks, and queues.	PO3, PO4, PSO1	III, IV	4	8
CO4	Design and execute algorithms for trees and graphs including traversal, searching, and updating.	PO4, PO5, PSO2	V	5	9

UNIT – I:

Structure and Union Types: Introduction, User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Complex Structures, Self-Referential Structures, Bit Fields, Union Types, typedef, Enumeration.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT – II:

Text and Binary File Pointers: Files Introduction, Modes of File, Input/ Output Files - Review and Further Study, Binary Files, Searching a Database, File status functions, File positioning functions, Command Line Arguments, Multifile Programming.

UNIT–III:

Introduction to Data Structures: Abstract data types, selecting a Data Structure, Linear list —Introduction, singly linked list, Circular Linked Lists, Doubly Linked List.

UNIT – IV:

Stacks: Stack ADT, Stack applications -Infix Expression to Postfix Expression Conversion, Postfix Expression Evaluation, Balancing Symbols, Expression Tree, Queues- Queue ADT

UNIT – V:

Trees: Introduction, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Binary Search Trees (BST),BST Operations- Searching, Insertion and Deletion, BST ADT.

Graphs: Introduction to types of Graphs, Bi connected Components, Representation of Graphs, Graph Traversal Algorithms – Depth First Search, Breadth First Search, Graph ADT, Applications of Graphs.

TEXTBOOKS:

1. DataStructures: A Pseudocode ApproachwithC, 2ndEdition, R.F.Gilbergand B.A.Forouzan, Cengage Learning
2. DataStructureusingC–ReemaThareja,3rd Edition, Oxford University Press.
3. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
2. BrianW.Kernighan and Dennis M.Ritchie, The C Programming Language, Prentice Hall of India.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25MS12001-Innovation and Entrepreneurship

B. Tech. ECE – I Year II Sem.

Prerequisite(s): None

L	T	P/D	C
2	-	-/-	2

Course Objectives: Develop an ability to

1. To familiarize on the basic concepts of innovation, entrepreneurship and its importance.
2. To Identify and analyze the process of problem opportunity identification, market segmentation, and idea generation techniques.
3. To initiate prototype development and understand minimum viable product.
4. To develop initial business and financial planning and Go-to-Market strategies
5. To impart knowledge on establishing startup, venture pitching and IPR

Course Outcomes: At the end of the course, students would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Apply the entrepreneurship and the entrepreneurial process and its significance in economic development.	PO5, PO11	I, III	3	9
CO2	Assess the problem from an industry perspective and generate solutions using the design thinking principles.	PO6	II	4,6	
CO3	Assess market competition, estimate market size, and develop a prototype.	PO 3, PO11	III	4,6	
CO4	Analyze business and financial planning models and Go-to-Market strategies.	PO11	IV	4	
CO5	Able to build a start-up, register IP and identify funding opportunities.	PO6, PO7, PO11	V	5,6	

UNIT-I:

Fundamentals of Innovation and Entrepreneurship

Innovation: Introduction, need for innovation, Features, Types of innovations, innovations in manufacturing and service sectors, fostering a culture of innovation, planning for innovation.

Entrepreneurship: Introduction, types of entrepreneurship attributes, mindset of entrepreneurial and intrapreneurial leadership, Role of entrepreneurs in economic development. Woman Entrepreneurship, Importance of on-campus startups. Understanding to build entrepreneurial mindset attributes and networks individuals while on campus.

Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16 industries to choose from), Venture Activity.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-II:

Problem and Customer Identification

Identification of gap, problem, analyzing the problem from a industry perspective, real-world problems, market and customer segmentation, validation of customer problem fit, Iterating problem-customer fit, Competition and Industry trends mapping and assessing initial opportunity, Porter's Five Force Model. Idea generation, Ideation techniques: Brainstorming, Brain writing, Round robin, and SCAMPER, Design thinking principles, Mapping of solution to problem.

Core Teaching Tool: Several types of activities including: Class, game, GenAI, 'Get out of the Building' and Venture Activity.

UNIT-III:

Opportunity assessment and Prototype development

Identify and map global competitors, review industry trends, and understand market sizing: TAM, SAM, and SOM. Assessing scope and potential scale for the opportunity.

Understanding prototyping and Minimum Viable Product (MVP).

Developing a prototype: Testing, and validation.

Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

UNIT-IV:

Business & Financial Models

Introduction to Business Model and types, Lean Canvas Approach: 9-block lean canvas model, building lean canvas for your startup. Business planning: components of Business plan- Sales plan, People plan and financial plan, Financial Planning: Types of costs, preparing a financial plan for profitability using a financial template, understanding the basics of Unit economics, Economies of Scale and analyzing financial performance. Go-To-Market (GTM) approach—Selecting the Right Channel, creating digital presence, and building customer acquisition strategy.

Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.

UNIT-V:

Startups and IPR

Startup requirements, building founding team members and mentors, pitch preparation, start-up registration process, funding opportunities and schemes, institutional support to entrepreneurs, startup lifecycle, documentation, legal aspects in startup, venture pitching readiness, National Innovation Startup Policy (NISP) and its features.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Patents, Designs, Patentability, Procedure for grants of patents. Indian Scenario of Patenting, International Scenario: International cooperation on Intellectual Property. Patent Rights: Scope of Patent Rights. Copyright, trademark, and GI. Licensing and transfer of technology.

Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

Text Books:

1. John R Bessant, Joe Tidd, Innovation and Entrepreneurship, 4E, Wiley, Latest Edition.
2. Ajay Batra, The Startup Launch Book-A Practical Guide for Launching Customer Centric Ventures, Wiley, 2020. (For Core Teaching Tool).

Reference Books:

1. Entrepreneurship Development and Small Business Enterprises, Poornima M Charantimath, 3E, Pearson, 2018.
2. D.F.Kuratko and T.V.Rao, Entrepreneurship: A South-Asian Perspective, Cengage Learning, 2013.
3. Robert D.Hisrich, Michael P.Peters, Dean A.Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition.
4. NISP-Brochure inside pages- startup_policy_2019.pdf

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25PH12L01 - Advanced Engineering Physics Laboratory

B. Tech. ECE - I Year II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives: Develop an ability to

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To study the physical properties of materials like semiconductors, ferromagnetic, and ferroelectric substances.
3. To perform semiconductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

Course outcomes: At the end of the course, the student would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Experiments	BTL	Related SDGs
CO1	Analyze the characteristics of Solar cell and LED	PO1, PO2	3,4	4	4
CO2	Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.	PO1, PO2	6,7,8,9	4	
CO3	Characterize semiconductors using Hall effect and energy gap measurement techniques.	PO1, PO2	1,2	4	
CO4	Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.	PO1, PO2	5,10	4	
CO5	Apply scientific methods for accurate data collection, analysis, and technical report writing.	PO1, PO2	All	4	

List of Experiments: (A minimum of **Eight** Experiments)

1. Determination of energy gap of a semiconductor.
2. Determination of Hall coefficient and carrier concentration of a given semiconductor.
3. Plot the V-I characteristics of a Solar cell.
4. Determination of Planck's constant using the V-I characteristics of the LED.
5. a. Determination of wavelength of a laser using a diffraction grating.
b. Study of V-I & L-I characteristics of a given laser diode.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

6. Determination of the magnetic moment of a bar magnet and the horizontal Earth's magnetic field.
7. Study of the B-H curve of ferromagnetic material.
8. Study of the P-E loop of a given ferroelectric crystal.
9. Determination of the dielectric constant of a given material.
10. a. Determination of the numerical aperture of a given optical fibre.
b. Determination of bending losses of a given optical fibre.

Equipment required:

1. Energy gap apparatus with thermometer.
2. Hall Effect Apparatus.
3. Solar cell arrangement with light source.
4. Characteristics of LED and LASER diode circuit board.
5. Bar magnet and other apparatus.
6. B-H Curve kit.
7. P-E loop kit.
8. RC circuit board and stop clock.
9. Optical fiber kit.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC12L01-Electronic Devices and Circuits Laboratory

(Common to ECE and EEE)

B.Tech. ECE - I Year II Sem.

L	T	P	C
-	-	2	1

Prerequisite(s): None

Course Objectives: Develop an ability to

1. Identify various electronic components and understand their specifications.
2. Understand and operate various electronic measuring instruments.
3. Understand the characteristics of diode, and its applications in rectifier and voltage regulator.
4. Understand the characteristics of BJT and FET, and their application in amplifier circuits.
5. Understand the procedure for biasing of BJT.
6. Understand the procedure to simulate electronic circuits using various software tools.

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

CO	Course Outcomes	Related POs and PSOs	Related Expts.	BTL	Related SDGs
CO1	Use electronic instruments for measuring the parameters of various circuit components	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	A. 1-4	2	4
CO2	Analyze the V-I characteristics of semiconductor devices such as diodes, BJTs, and FETs.	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	B. 1-5 C. 4-7	4	
CO3	Assess basic rectifier, clipper, clamper, and voltage regulation circuits.	PO1, PO2, PO3, PO4, PO5, PO6, PSO1, PSO2	B. 2-4 C. 1-2	3	
CO4	Design biasing techniques for BJTs and determine their operating point using DC load line analysis.	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	B.6	3	
CO5	Analyze transistor amplifier circuits in various configurations using h-parameter models.	PO1, PO2, PO3, PO4, PO5, PO11, PSO1, PSO2	C.3	4	
CO6	Simulate and interpret electronic circuits using appropriate simulation tools.	PO1, PO2, PO3, PO4, PO5, PO11, PSO1, PSO2	C.1-7	3	4, 9

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

List of Experiments

A. Electronic Workshop Practice (Two lab sessions):

1. Identification, specification and testing of R, L, C Components, Potentiometers, Rheostats, Switches (SPST, SPDT, DPST, DPDT and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Sensors (LDR, Thermistors, Piezo-Buzzers)
2. Identification, specification, testing of Active Devices - Diode, BJT, JFET, MOSFET, Power Transistor, LED, LCD.
3. Study and operation of Multimeter, Voltmeter, Ammeter, Function Generator, Regulated Power Supply and CRO.
4. Soldering practice.

B. Hardware-Based Experiments (A minimum of 6 experiments are to be conducted):

1. Study the V-I characteristics of a PN junction diode in forward and reverse bias to determine cut-in voltage and dynamic resistance.
2. Examine the reverse bias characteristics of a Zener diode and demonstrate its application as a voltage regulator under varying conditions.
3. Design and analyze half-wave and full-wave rectifiers (center-tap and bridge) with and without capacitor filters to evaluate ripple factor and output voltage.
4. Implement clipper and clamper circuits to observe waveform shaping through positive, negative, and biased configurations.
5. Plot the input and output characteristics of a BJT in common emitter configuration to determine input/output resistance and current gain.
6. Design and test fixed bias and voltage divider bias circuits to establish a stable operating point for a BJT amplifier and study DC load line behavior.
7. Construct and analyze a Common Base (CB) configuration of a BJT to study input-output characteristics and determine current gain (α) and input/output resistance.

C. Software-Based Simulation Experiments (A minimum of 6 experiments are to be conducted):

1. Simulate a full-wave bridge rectifier with capacitor filter to analyze waveform smoothing and ripple reduction in DC power supply design.
2. Simulate a Zener diode-based voltage regulator to study voltage stabilization against varying supply voltages and load resistances.
3. Simulate a common emitter amplifier with and without emitter bypass capacitor to analyze the effect on voltage gain and signal amplification.
4. Simulate BJT operation as a switch and small-signal amplifier to understand its dual functionality in digital and analog applications.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

5. Simulate the output and transfer characteristics of a JFET to determine parameters such as pinch-off voltage, drain resistance, and transconductance.
6. Simulate the characteristics of a MOSFET and design a CMOS inverter to study digital switching behavior and low-power logic design.
7. Simulate the transfer and output characteristics of an enhancement-mode NMOS transistor to analyze threshold voltage, drain current, and switching behavior.

Hardware Requirements:

1. Regulated DC Power Supply (0–30V)
2. Function Generator: 0-1 MHz
3. Ammeters: 0-200 μ A, 0-200 mA
4. Voltmeters: 0-30 V
5. Cathode Ray Oscilloscope (CRO) : 0-20 MHz
6. Breadboards and Connecting Wires
7. Components:
Resistors, Inductors, Capacitors, BJTs (BC107), LCDs, JFETs (BFW10), LEDs, MOSFETs (IRF540N), Diodes-Ge & Si type, Transistors –NPN, PNP type, LDRs, Bread boards, Potentiometers, Rheostats, Switches – SPST, SPDT, DPST, DPDT and DIP, Coils, Gang condensers, Relays, PCBs, Thermistors, Piezo Buzzers and Power transistors.

Software Requirements (Any one of the listed tools or equivalent):

1. LTSpice (Free from Analog Devices)
2. NI Multisim (Academic License or Student Version)
3. Proteus Design Suite (Simulation and PCB Design)
4. TINA-TI (Free from Texas Instruments)
5. PSPICE for TI or OrCAD Lite
6. Windows PC or Laptop with minimum 4GB RAM and i3 processor or better.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS12L02- Data Structures Laboratory

B. Tech. ECE – I Year II Sem.

Prerequisite(s): Programming for Problem Solving

L	T	P/D	C
-	-	2/-	1

Course Objectives: Develop ability to

1. **Introduce students to advanced data representation techniques** in C using structures, unions, enumerations, and typedef to effectively organize and manipulate complex data types.
2. **Proficiency in file handling and data storage concepts**, including text and binary file operations, database searching, file positioning, and multifile program design.
3. **Build foundation in abstract data types and linear data structures**, enabling students to implement and manage linked lists, circular lists, and doubly linked lists for efficient data organization.
4. **Train students in the use of stacks and queues** for solving computational problems such as expression conversion, evaluation, and balancing of symbols through algorithmic thinking.
5. **Equip students with knowledge of hierarchical and network data structures**, including trees and graphs, and their associated algorithms for searching, traversal, and application in problem-solving.

Course outcomes (COs): At the end of the course, student would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	I,II,III,IV	4	4,8,9
CO2	Ability to implement the concepts of Trees and Graphs	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	V	4	4,9

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
i) Arrays ii) ADT
5. Write a program that implement Queue (its operations) using
i) Arrays ii) ADT

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

6. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
7. Write a program to implement Binary Search tree
8. Write a program to implement the Graph traversal methods.
 - i)DFS
 - ii)BFS

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25ME12L01 Engineering Workshop

L	T	P	C
-	-	2	1

B.Tech. ECE I Year II Sem.

Prerequisites: Practical skills

Course Objectives:

1. To introduce students to basic manufacturing processes and workshop practices.
2. To provide hands-on training in carpentry, fitting, welding, sheet metal, and machining
3. To develop skills in using hand tools and measuring instruments.
4. To enhance safety awareness and proper handling of workshop equipment.
5. To build a foundational understanding of industrial production and fabrication.

Course Outcomes: At the end of the course, students would be able to

CO	Course Outcomes	Related POs and PSOs	Related exercises	BTL	SDGs
CO1	Understand the basic manufacturing processes and operations	PO1, PO3, PO9 PSO3	I, ii, iii, iv, v, viii	4	4, 9, 12
CO2	Use hand tools and equipment safely and efficiently.	PO1, PO3, PO9	I, ii, iii, iv, v, vi, viii	3	
CO3	Perform basic operations in carpentry, fitting, welding, sheet metal work, and machining	PSO3	I, ii, iii, iv, v, viii	2	
CO4	Read and interpret workshop drawings	PO1, PO3, PO9	I, ii, iii, iv, v, vi, viii	2	
CO5	Develop teamwork, time management, and quality awareness in a workshop environment.	PSO3	I, ii, iii, iv, v, vi, viii	2	

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

- Carpentry:** T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint
- Fitting:** V- Fit, Dovetail Fit and Semi- circular fit
- Tin Smithy:** Square Tin, Rectangular Tray and Conical Funnel
- Foundry:** Preparation of Green Sand Mould using Single Piece and Split Pattern
- Welding Practice:** Arc Welding and Gas Welding
- House wiring:** Parallel and Series, Two-way Switch and Tube Light
- Black Smithy:** Round to Square, Fan Hook and S- Hook

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015.
2. Workshop Practice Manual, K. Venkata Reddy, BS Publication, 6th Edition, Rpt. 2025.

REFERENCE BOOKS:

1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25MA21001: Numerical Methods and Complex Variables

B. Tech. ECE II Year, I Sem.

Prerequisite(s): None

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop ability to

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms.
2. Apply various numerical methods to find roots of algebraic and transcendental equations and estimate the polynomial for the given data.
3. Evaluation of integrals using numerical techniques and solve the ordinary differential equations of first order using iterative techniques.
4. Identify the analytic function and construct the analytic function.
5. Express the complex function as power series and evaluate the complex integral using Cauchy's theorems.

Course outcomes (COs): At the end of the course, student would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Express periodic and non-periodic functions using Fourier series and Fourier Sine/Cosine transforms, and utilize these techniques to analyze and solve fundamental engineering problems.	PO1, PO2, PO3 and PSO 1	I	4	4, 9
CO2	Estimate unknown function through interpolation and find roots of algebraic and transcendental equations by applying appropriate numerical techniques.	PO1, PO2, PO3 and PSO 1	II	4	
CO3	Evaluate definite integrals numerically and solve first-order ODEs using iterative methods.	PO1, PO2, PO3 and PSO 1	III	4	
CO4	Construct the analytic function using Milne-Thompson Method. Expand the complex function as a power series and evaluate the complex integrals.	PO1, PO2, PO3 and PSO 1	IV & V	4	

UNIT-I:

Fourier Series & Fourier Transforms

Fourier series – Dirichlet's Conditions – Half-range Fourier series – Fourier Transforms: Fourier Integral Theorem (Only statements), Fourier Sine and Cosine transforms (Elementary illustrations)

UNIT-II:

Numerical Methods-I

Solution of polynomial and transcendental equations: Bisection method – Iteration Method – Newton- Raphson method and Regula-Falsi method. Finite differences: forward differences

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

– backward differences – central differences – symbolic relations – Interpolation using Newton's forward and backward difference formulae – Lagrange's method of interpolation.

UNIT-III:

Numerical Methods-II

Numerical integration: Trapezoidal rule - Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rules.

Ordinary differential equations: Taylor's series – Euler's method – Runge-Kutta method of fourth order for first order ODE.

UNIT-IV:

Complex Differentiation

Differentiation of Complex functions – Analyticity – Cauchy-Riemann equations (without proof) – Harmonic Functions – Finding harmonic conjugate – Milne-Thomson method – Elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V:

Complex Integration

Line integral – Cauchy's theorem – Cauchy's Integral formula – Zeros of analytic functions – Singularities – Taylor's series – Laurent's series. Residues – Cauchy Residue theorem (All theorems without Proof).

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS

1. Murray R. Spiegel, Ph.D., Seymour Lipschutz, Ph.D., John J. Schiller, Ph.D., Dennis Spellman, Ph.D., Complex Variables (Schaum's outline).
2. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill, 2004.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC21001 - Signals and Systems

B.Tech. ECE - II Year I Sem.

L	T	P/D	C
3	-	- / -	3

Pre-Requisite(s): 25MA11001-Matrices and Calculus

Course Objectives: Develop ability to

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI Systems, convolution and correlation properties.
3. Understand Laplace and Z-transform their properties applicable to analysis of signals and systems.
4. Identify the need for sampling of CT signals and types of Sampling of CT signals

Course Outcomes: At the end of the course the student would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Characterize various signals, systems and conduct their time and frequency domain analysis, using time domain and transform domain techniques.	PO1, PO2	I, II, IV, V	3	4
CO2	Determine the conditions for distortion less transmission of signals through systems and conditions for physical realization of systems	PO1, PO2, PO3	III	3	
CO3	Analyze the concept of correlation between signals and power spectral density of a signal and their applications.	PO1, PO2, PO3, PO4	IV	3	
CO4	Explain the significance of sampling theorem for baseband and band-pass signals	PO1, PO2, PO3, PO4	V	2	

UNIT-I

Signal Analysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT-II

Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signals, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-III

Signal Transmission through Linear Systems: Linear System, Impulse response, Response of a Linear System, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution. Linear Time Invariant (LTI) System, and its Transfer function, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and risetime. Extraction of Signal from Noise by Filtering.

UNIT-IV

Laplace Transform: Laplace Transforms (L.T), Inverse Laplace Transform, and Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Correlation: Auto Correlation and Cross Correlation Functions, Relation between Convolution and Correlation, Properties of Correlation Functions, Energy Density Spectrum, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Parseval's Theorem, Detection of Periodic Signals in the presence of Noise by Correlation.

UNIT-V

Sampling theorem: Graphical and analytical proof of Sampling Theorem for Base band/Band Limited and Band Pass Signals, Types of Sampling: Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling — Aliasing

Z-Transform: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXTBOOKS

1. Signals, Systems & Communications -B.P. Lathi, BS Publications.
2. Signals and Systems – Allan. V. Oppenheim, Allan. S. Willsky with S. Hamid. Nawab, 2nd Ed. Pearson.

REFERENCE BOOKS

1. Fundamentals of Signals and Systems – Michel J. Roberts, Govind Sharma, 2nd Ed., MGH.
2. Signals, Systems and Transforms - Charles. L. Philips, John M. Parr and Eve A. Riskin, 4th Ed., 2004, Pearson, Prentice Hall.
3. Principles of Signal Processing and linear Systems, BP Lathi, Oxford University Press, 2009

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC21002 - Digital Logic Design

(Common to ECE, EEE, CSE, CSE (AIML), CSE(DS) and CSE(CS))

B.Tech. ECE - II Year I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives: Develop an ability to

1. Understand basic concepts of various number systems used in digital systems.
2. Understand Boolean algebra and various Boolean simplification theorems.
3. Understand simplification of Boolean functions using k-map and tabular method.
4. Understand design and analysis of combinational and sequential logic circuits.
5. Understand symmetric functions and design the same using relay contacts.
6. Understand Threshold logic and design switching functions using threshold elements

Course Outcomes: At the end of the course the student would be able to

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Apply knowledge of number systems, codes and Boolean algebra to the analysis and design of digital logic circuits	PO1, PO2, PO3, PO4, PSO1	I	3	4, 8, 9
CO2	Apply the knowledge of logic gates to design and implement various digital circuits	PO1, PO2, PO3, PO4, PSO1	II	3	
CO3	Identify, formulate, and solve simple problems in the area of digital logic circuit design.	PO1, PO2, PO3, PO4, PSO1	III	4	
CO4	Apply the concepts of symmetric functions, Threshold logic to design logic circuits.	PO1, PO2, PO3, PO4, PSO1	IV	3	
CO5	Design digital circuits, component(s) or process to meet desired needs within realistic constraints	PO1, PO2, PO3, PO4, PSO1	V	3	

UNIT- I:

Number Systems: Binary, Octal, Decimal, Hexadecimal, Fixed-point and Floating-point Number Representations, Complements of Numbers: 1's and 2's Complement, Error Detection and Correction Codes: Parity Check, Hamming Code.

Boolean Algebra and Logic Gates: Axiomatic definitions, basic theorems and properties, Boolean Functions: Canonical and standard forms, Digital Logic Gates

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Overview.

UNIT-II:

Gate-Level Minimization Techniques: Karnaugh maps: 2, 3, and 4 variables, Sum-of-products (SOP) and product-of-sums (POS) simplification, Don't care conditions, Implementation using NAND and NOR gates.

UNIT-III:

Combinational Logic Circuits: Analysis and design procedures, Binary adder-subtractor and BCD adder, magnitude comparator, decoders, encoders, multiplexers and demultiplexers.

UNIT-IV:

Synthesis of Symmetric Networks: Relay Contacts, Analysis and Synthesis of Contact Networks, Symmetric Networks, Identification of Symmetric Functions and realization of the same.

Threshold Logic: Threshold Element, Capabilities and Limitations of Threshold logic, Elementary Properties, Synthesis of threshold networks (Unate function, Linear separability, Identification and realization of threshold functions, Map based synthesis of two-level Threshold networks).

UNIT-V:

Sequential Machines Fundamentals

Sequential Logic Circuits: Gated latches, Flip-flops: Clocked S-R, D, T, JK, Master-Slave JK, Design of synchronous and asynchronous counters, Shift registers: types and applications

Synchronous Sequential Logic Moore and Mealy state machines, State diagrams, State tables, and state reduction, Case studies: sequence detector, traffic light controller, vending machine.

Text Books:

1. Switching and Finite Automata Theory, Zvi Kohavi & Niraj K. Jha, 2nd Edition, 2009, Cambridge University Press.
2. M. Morris Mano, Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, 6th Edition, Pearson Education/PHI, 2017.

Reference Books:

1. Digital Fundamentals - A Systems Approach", Thomas L. Floyd, Pearson, 2013.
2. Fundamentals of Logic Design, Charles H. Roth, Cengage Learning, 5th Edition, 2004.
3. Digital Design, Morris Mano, PHI, 3rd Edition

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC21003 - Electronic Circuit Analysis

L	T	P	C
3	-	-	3

B.Tech. ECE - II Year I Sem.

Prerequisite(s): 25EC12001 - Electronic Devices and Circuits

Course Objectives: Develop ability to

1. Understand analysis of single and multistage amplifiers in low frequency region
2. Understand analysis of transistor amplifier in high frequency region.
3. Understand the concept of feedback in an amplifier and analysis of various feedback amplifiers.
4. Understand the concept of positive feedback in LC, RC and Crystal based oscillators.
5. Understand performance of power amplifiers in terms of efficiency and distortion.
6. Understand multivibrator circuits and their waveform generation.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Analyze and classify multistage amplifier configurations and determine the impact of coupling schemes on amplifier performance and frequency response.	PO1, PO2, PO3, PO4, PSO1	1	3	4
CO2	Apply the hybrid- π transistor model to evaluate high-frequency behavior of common-emitter amplifiers and calculate gain-bandwidth product.	PO1, PO2, PO3, PO4, PSO1	1	3	
CO3	Examine feedback amplifier types and assess the influence of negative feedback on gain stability, bandwidth, and distortion.	PO1, PO2, PO3, PO4, PSO1	2	2	
CO4	Design and analyze LC, RC, and crystal oscillators based on the Barkhausen criterion to generate sinusoidal waveforms.	PO1, PO2, PO3, PO4, PSO1	3	4	
CO5	Analyze power amplifiers and evaluate their performance in terms of efficiency and distortion.	PO1, PO2, PO3, PO4, PSO1	4	3	
CO6	Design multivibrator circuits and analyze their output waveforms.	PO1, PO2, PO3, PO4, PSO1	5	4	

UNIT – I :

Multistage Amplifiers: Classification of Amplifiers, Distortion in Amplifiers, Coupling schemes: RC, Transformer, Direct coupling, Frequency response of multistage amplifiers, Transistor configuration choice in cascade amplifiers, Cascade and Cascode amplifiers, Darlington pair amplifier.

High-Frequency Transistor Model: Hybrid- π model, Hybrid- π parameters: Conductances and capacitances, CE short-circuit current gain, Gain with resistive load and gain-bandwidth product

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT - II:

Feedback Amplifiers: Concept and need for feedback in amplifiers, Types and classification of feedback amplifiers, Characteristics of negative feedback: Gain stability, bandwidth, noise, distortion, Voltage series, Voltage shunt, Current series, Current shunt configurations.

UNIT - III:

Oscillators: Principle of positive feedback, Barkhausen Criterion for oscillations, LC Oscillators: Generalized analysis, Hartley, Colpitts, RC Oscillators: RC phase shift, Wien bridge, Crystal oscillator: Working and advantages

UNIT - IV:

Power Amplifiers: Classification: Class A, B, AB, C, Series-fed Class A amplifier, Transformer- coupled Class A amplifier, Class B amplifier: Push-pull, Complementary symmetry, Efficiency calculations and Crossover distortion.

UNIT - V:

Multivibrators: Analysis and design of Bistable, Monostable and Astable multivibrators and Schmitt Trigger using transistors.

Tuned Amplifiers: Analysis and Design of Single tuned amplifier and its applications.

Text Books:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. McGraw-Hill Education, 2008.
2. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 2008.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. 7th ed., Oxford University Press, 2015.

Reference Books:

1. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. 11th ed., Pearson Education, 2013.
2. Millman, Jacob, and Arvin Grabel. Microelectronics. 2nd ed., McGraw-Hill, 1987.
3. Malvino, Albert Paul. Electronic Principles. 7th ed., McGraw-Hill Education, 2007.
4. Millman, Jacob, and Herbert Taub. Pulse, Digital, and Switching Waveforms. McGraw-Hill Education, 1991.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC21004 - Network Analysis and Synthesis

B.Tech. ECE - II Year I Sem.

L	T	P	C
3	1	-	4

Pre-requisite(s): 25EE11001 - Basic Electrical Engineering,
 25MA12001 - Ordinary Differential Equations and Vector Calculus

Course Objectives: Develop ability to

1. Understand and analyze first order differential equations of single time constant circuits.
2. Understand transient and steady state response of circuits using Laplace transforms.
3. Understand various parameters of symmetrical and asymmetrical two-port networks.
4. Classify and characterize various types of passive filters.
5. Understand the concepts of RL and RC network synthesis.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Analyze transient and steady state responses of RL and RC circuits in time domain.	PO1, PO2, PSO1	I	3	4
CO2	Analyze transient and steady state responses of RL, RC and RLC circuits in S-domain.	PO1, PO2, PSO1	II	3	
CO3	Analyze two-port networks using Z, Y, ABCD and h – parameters	PO1, PO2, PSO1	III	3	
CO4	Design constant-k, m-derived low pass and high pass passive filters for given specifications	PO1, PO2, PSO1	IV	3	
CO5	Synthesize RC and RL networks by Foster and Cauer methods.	PO1, PO2, PSO1	V	3	

Unit - I:

Transient and steady state analysis of single time constant circuits in time domain

Review of circuit elements and sources, KVL and KCL, and formulation of network equations; Initial conditions in networks, Transient and steady state analysis of single time constant circuits in time domain for step, impulse and sinusoidal inputs.

Unit - II:

Applications of Laplace transforms for circuit analysis

Transient and steady state analysis of single time constant circuits in s-domain for step, impulse and sinusoidal inputs. Transient and steady state analysis of RLC circuits in s-domain for step and sinusoidal inputs.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT- III:

Two-port network parameters: Open circuit impedance (Z), Short circuit admittance (Y), Hybrid (h), Transmission (ABCD) parameters; Characteristic impedance, Propagation constant of T and π sections; Image Impedance, Image transfer constant of L, T and π sections

Unit - IV:

Passive Filters

Need of filters in communication engineering. Classification of filters: Low pass, High pass, Band pass and Band-elimination. Characteristics: Pass band, Stop band, transition band, attenuation constant (α) and phase constant (β). Examples of filter applications in communication engineering (LPF, BPF, Notch filter). Filter Networks: L, T, π and their characteristics. Analysis and design of constant - k filters: LP and HP. Analysis and design of m - derived filters: LP and HP.

Attenuators and Equalizers

Design of symmetrical T and π attenuators. Qualitative treatment of Equalizers.

UNIT - V

Network Synthesis:

Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non-ladder networks, Poles, Zeros analysis of network functions, Hurwitz polynomials, Positive Real Functions, synthesis of RC and RL Network by Foster and Cauer methods.

Text Books:

1. Network Analysis, M. E. Van Valkenburg, T.S. Rathore, Revised Third Edition Pearson, 2019.
2. Circuits and Networks: Analysis and Synthesis, A. Sudhakar, Shyam mohan S. Palli, TMH, 2017.

Reference Books:

1. Engineering Circuit Analysis, W H Hayt, J E Kemmerly and S M Durbin, 4th Ed., TMH.
2. Basic Circuit Theory, Charles A. Desoer and Ernest S. Kuh, TMH, 2010.
3. Circuit Theory, A. Chakrabarti, Dhanpat Rai Educational Publishers, 2013.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25MA21L01: Computational Mathematics Lab
(Using Python/MATLAB software)

B. Tech. ECE II Year I Sem.

L	T	P/D	C
-	-	2	1

Pre-requisites: 25MA11001 - Matrices and Calculus
25MA12001 - Ordinary Differential Equations and Vector Calculus

Course Objectives: Develop ability to

1. Generate algorithm/program and evaluate the Eigen values and vectors of a matrix.
2. Write the program to implement the iterative methods to find roots of algebraic and transcendental equations and also to solve linear system of equations iteratively.
3. Construct a program to solve first and higher order ordinary differential equations and apply first order ordinary differential equations to the Newton's laws of growth/decay and cooling.

Course outcomes: At the end of the course, student would be able to develop and execute a Python program to:

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Evaluate Eigen values and vectors of a given matrix.	PO1, PO2, PO3, PSO 1	I	4	4, 9
CO2	Find the roots of algebraic and transcendental equations using iterative methods	PO1, PO2, PO3, PSO 1	II	4	
CO3	Compute solution of system of linear equations using iterative methods.	PO1, PO2, PO3, PSO 1	III	4	
CO4	Solve ordinary differential equations of first and higher order and apply the first order ordinary differential equations to the Newton's laws of growth/decay and cooling.	PO1, PO2, PO3, PSO 1	IV & V	4	

UNIT - I: Eigen values and Eigenvectors:

Programs:

- Finding real and complex Eigen values.
- Finding Eigen vectors.

UNIT-II: Solution of Algebraic and Transcendental Equations

Bisection method, Newton Raphson Method

Programs:

- Root of a given equation using Bisection method.
- Root of a given equation Newton Raphson Method.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-III: Linear system of equations:

Jacobi's iteration method and Gauss-Seidal iteration method

Programs:

- Solution of given system of linear equations using Jacobi's method
- Solution of given system of linear equations using Gauss-Seidal method

UNIT-IV: First-Order Ordinary Differential Equations

Exact and non-exact equations, Applications: exponential growth/decay, Newton's law of cooling.

Programs:

- Solving exact and non-exact equations
- Solving exponential growth/decay and Newton's law of cooling problems

UNIT-V: Higher order linear differential equations with constant coefficients

Programs:

- Solving homogeneous Ordinary Differential Equations
- Solving non-homogeneous Ordinary Differential Equations

*** Visualize all solutions Graphically through programmes**

TEXT BOOKS:

1. MATLAB and its Applications in Engineering, Rajkumar Basal, Ashok Kumar Geo, Manoj Kumar Sharma, Pearson publication.
2. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
3. Think Python First Edition, by Allen B. Downey, Orielly publishing.
4. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak et al., NCLab Public Computing, 2012.
5. Introduction to Python Programming, ©Jacob Fredslund, 2007.

REFERENCE BOOKS:

1. An Introduction to Python, John C. Lusth, The University of Alabama, 2011.
2. Introduction to Python, ©Dave Kuhlman, 2008.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC21L01– Digital Logic Design Lab

B. Tech. ECE - II Year I Sem.

Prerequisite(s): None

L	T	P	C
-	-	2	1

Course Objectives: Develop ability to

1. Understand the fundamental principles of Boolean algebra and digital logic needed to analyze and simplify logic expressions.
2. Design and implement basic combinational and sequential logic circuits using standard logic gates and ICs.
3. Describe digital systems using Verilog HDL in dataflow, behavioral, and structural modeling styles.
4. Simulate, test, and verify digital logic designs using industry-standard EDA tools and test bench methodologies.
5. Build modular, hierarchical digital components such as counters, finite state machines (FSMs), and shift registers for larger digital systems.

Course outcomes: At the end of the course, the student would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Experiments	BTL	Related SDGs
CO1	Analyze and simplify Boolean expressions and implement them using logic gates and ICs.	PO1, PO2, PO3, PO4, PO5 and PSO1, PSO2	Part A: Expt - 1, 3	3	4, 9,11
CO2	Design and realize combinational and sequential logic circuits using logic gate hardware.	PO1, PO2, PO3, PO4, PO5 and PSO1, PSO2	Part A: Expt - 2, 4, 5, 6	4	
CO3	Model digital systems in Verilog HDL using dataflow, behavioral, and structural styles.	PO1, PO2, PO3, PO4, PO5 and PSO1, PSO2	Part B: Expt - 1, 2, 3, 4	4	
CO4	Simulate and verify digital designs using industry-standard EDA tools and test benches.	PO1, PO2, PO3, PO4, PO5 and PSO1, PSO2	Part B: Expt 1, 2, 3, 4	4	
CO5	Build modular and hierarchical designs such as counters, FSMs, and shift registers.	PO1, PO2, PO3, PO4, PO5 and PSO1, PSO2	Part B: Expt 5, 6, 7, 8	4	

List of Experiments: (A minimum of TEN Experiments to be conducted.)

A. Realization in Hardware Laboratory (Using Logic ICs)

These are fundamental hands-on experiments conducted using logic ICs such as AND, OR, NOT, NAND, NOR, XOR gates, flip-flops, multiplexers, and decoders.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

1. Realize and minimize Boolean functions using basic gates and universal gates (NAND/NOR) in SOP/POS form.
2. Design and implement Half Adder, Full Adder, Half Subtractor, and Full Subtractor using logic gates.
3. Construct and analyze basic logic gates (AND, OR, NOT, XOR, XNOR) using only NAND and NOR gates.
4. Design and implement parity bit generators (even and odd) and a 4-input majority logic circuit.
5. Design and implement code converters such as Binary to Gray, Gray to Binary, and BCD to Excess-3 using gates.
6. Design and implement simple combinational circuits: 2-to-1 multiplexer, 1-bit comparator, and 7-segment decoder logic.

B. Verilog HDL-Based Digital Design Experiments (Simulation-Based)

These experiments are implemented using **Verilog HDL** with different modeling styles (dataflow, behavioral, structural) and simulated using tools like **Vivado, ModelSim, or Xilinx ISE**.

1. Design and simulate a 2-bit comparator using dataflow modeling; extend it to 4-bit using structural modeling.
2. Implement a 2:1 multiplexer using dataflow modeling and design an 8:1 multiplexer using structural modeling.
3. Design a 2-to-4 decoder using dataflow modeling and realize a 3-to-8 decoder using structural modeling.
4. Implement a given Boolean function using a decoder-based approach in behavioral modeling.
5. Design and simulate a universal n-bit shift register (left, right, hold, parallel load) using behavioral modeling.
6. Design a synchronous MOD-n counter using behavioral modeling with D or JK flip-flops.
7. Design and simulate an asynchronous (ripple) counter for a custom sequence using structural modeling.
8. Implement a sequence detector for a given binary pattern using FSM (Moore/Mealy) in behavioral modeling.

Required Hardware (For Hardware Lab Experiments):

Components	Description
Digital Trainer Kits	Breadboard with power supply and clock generator, LEDs, switches for I/O interface and testing.
Logic ICs	7400 (NAND), 7402 (NOR), 7408 (AND), 7432 (OR), 7486 (XOR), 7404 (NOT) etc.,
Flip-Flop ICs	7474 (D Flip-Flop), 74112 (JK Flip-Flop)
MUX/ Decoder ICs	74138, 74151, 74153

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Required Software tools (for Verilog HDL Experiments) (Any one of the tool below)

Software	Purpose
Xilinx Vivado	HDL Simulation and Synthesis
ModelSim	Verilog Simulation and Waveform Analysis
Xilinx ISE	Legacy support for Simulation and FPGA Design

Note: Not limited to the above experiments. Students can perform any extra experiments of the course as per their interest.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC21L03 - Electronic Circuit Analysis Lab

L	T	P	C
-	-	2	1

B.Tech. ECE - II Year I Sem.

Prerequisite(s): 25EC12001 - Electronic Devices and Circuits
25EC12L01 - Electronic Devices and Circuits Laboratory

Course Objectives: Develop ability to

1. Understand the functionality of multistage and power amplifiers.
2. Understand the design considerations of oscillators.
3. Understand the performance of waveform generation circuits.
4. Understand analog circuit performance using industry-standard software tools.
5. Summarize practical results and their correlation with theoretical predictions.

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

CO	Course Outcomes	Related POs and PSOs	Related expts.	BTL	Related SDGs
CO1	Design and analyze multistage and power amplifiers and evaluate their frequency response and efficiency.	PO1, PO2, PO5, PO8, PO9, PSO1, PSO2	A.1, A.4, A.5	3	4
CO2	Implement and examine feedback and oscillator circuits and validate theoretical conditions for sustained oscillations.	PO1, PO2, PO5, PO8, PO9, PSO1, PSO2	A.2, A.3	2	
CO3	Develop and interpret waveform generation circuits.	PO1, PO2, PO5, PO8, PO9, PSO1, PSO2	A. 6, A. 7	2	
CO4	Perform simulations to validate analog circuit performance using industry-standard software tools.	PO1, PO2, PO5, PO8, PO9, PSO1, PSO2	B. 1-7	2	
CO5	Correlate practical results with theoretical predictions and identify deviations due to real-world constraints.	PO1, PO2, PO5, PO8, PO9, PSO1, PSO2	B. 1-7	2	

List of Experiments:

Note:

- Minimum of 10 experiments should be conducted taking 5 each from Part A and Part B.

A. Hardware Experiments (7):

Perform practical design, implementation, and waveform analysis of amplifiers, oscillators, power stages, and multivibrators to validate theoretical concepts and observe real-world circuit behavior.

1. Determine current gain and input impedance of Darlington pair amplifier, and verify unity voltage gain.
2. Analyse Voltage Shunt feedback amplifier and compare the frequency response with and without feedback.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

3. Design an RC phase shift oscillator and derive the practical gain condition for oscillations at a given frequency.
4. Analyse a series-fed class A power amplifier, observe input/output waveforms, and calculate efficiency.
5. Analyse a class B power amplifier, analyze input/output waveforms, and evaluate harmonic distortion.
6. Design a bistable multivibrator, analyze commutating capacitor effects, and record transistor waveforms.
7. Design an astable multivibrator and observe transistor base and collector waveforms.

B. Software Simulations (7):

Use circuit simulation software to design, analyze, and verify the performance of feedback amplifiers, waveform generators, and power amplifier circuits through virtual experimentation and frequency response evaluation.

1. Design and simulate a two-stage RC coupled amplifier to demonstrate gain enhancement and study coupling capacitance effects.
2. Simulate Current series and Current shunt feedback amplifier topologies and compare their frequency responses with and without feedback.
3. Simulate Hartley and Colpitts oscillators for a specified frequency and observe their output waveforms.
4. Simulate a monostable multivibrator and analyze its input/output waveforms.
5. Simulate a Schmitt trigger and analyze the response for gain values greater than and less than one.
6. Simulate a complementary symmetry push-pull amplifier and verify elimination of crossover distortion.
7. Simulate a single tuned amplifier and determine the quality factor (Q) of its tuned circuit.

Software Requirements:

Simulation Tools: LTspice/Multisim/PSpice/ Proteus /NI Multisim Live or equivalent

Operating System: Windows 10/11 or Linux (Ubuntu preferred)

Hardware Requirements:

1. Dual Power Supply ($\pm 15\text{V}$, 0–30V)
2. Function Generator (up to 1 MHz)
3. CRO / DSO (Dual Channel, 20 MHz or more)
4. Digital Multimeters
5. Breadboards and Connecting Wires
6. BJTs: BC107, BC547, BC557, 2N2222, etc.
7. Resistors, Capacitors (Wide range of values)
8. Transformers (for power amplifiers)
9. Inductors, Crystals (1 MHz, 4 MHz, etc.)
10. Heat sinks, transistors for power stages (e.g., TIP41, TIP42 etc.)

Note: Not limited to the above experiments. Students can perform any extra experiments of the course as per their interest.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CE21VA1- ENVIRONMENTAL SCIENCE

L	T	P	C
1	-	-	-

Course Objectives

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

CO	Course Outcomes	Related POs & PSOs	Related Units	BTL	Related SDGs
CO1	Explain the structure, functions, and significance of ecosystems, energy flow, biogeochemical cycles, and ecological balance.	PO1, PO2 PSO1	I	2	4, 15
CO2	Analyze the utilization and conservation of natural resources, including water, land, forest, mineral, and energy resources, with reference to sustainability.	PO1, PO2, PO7 PSO1	II	4	6, 7, 12
CO3	Explain the importance of biodiversity, identify threats to biodiversity, and describe conservation strategies including in-situ and ex-situ methods.	PO1, PO2, PO7 PSO1	III	3	14, 15
CO4	Analyze different types of environmental pollution and evaluate pollution control technologies and global environmental initiatives.	PO1, PO2, PO4, PO7 PSO1, PSO3	IV	4	3, 11, 13
CO5	Explain environmental policies, legislation, EIA processes, and sustainable development concepts to address environmental challenges.	PO1, PO6, PO7, PO8 PSO1,	V	3	11, 12, 13

UNIT - I

Ecosystems:

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT - II

Natural Resources:

Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity and Biotic Resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies:

Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA:

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socioeconomical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publication

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS21SD5–LINUX AND SHELL SCRIPTING

B. Tech. ECE -II Year I Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives

1. To write shell scripts to solve problems.
2. To implement some standard Linux utilities such as ls,cp etc using system calls.
3. To develop network-based applications using C.

Course Outcomes: Upon completing this course, the students will be able to

1. Ability to understand the Linux environment
2. Ability to perform the file management and multiple tasks using shell scripts in Linux environment.

List of sample problems:

Note: Use Bash for Shell scripts.

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given integer.
8. Write an awk script to count the number of lines in a file that do not contain vowels.
9. Write an awk script to find the number of characters, words and lines in a file.
10. Write a C program that makes a copy of a file using standard I/O and system calls.
11. Implement in C the following Linux commands using System calls
a) cat b) mv
12. Write a C program to list files in a directory.
13. Write a C program to emulate the UNIX ls -l command.
14. Write a C program to list for every file in a directory, its inode number and file name.
15. Write a C program that redirects standard output to a file.Ex: ls > f1.
16. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
17. Write a C program to create a Zombie process.
18. Write a C program that illustrates how an orphan is created.
19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex :- ls -l | sort
20. Write C programs that illustrate communication between two unrelated processes using named pipe (FIFO File).
21. Write a C program in which a parent writes a message to a pipe and the child reads the message

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

TEXT BOOKS:

1. Beginning Linux Programming, 4th Edition, N. Matthew, R. Stones, Wrox, Wiley India Edition.
2. Advanced Unix Programming, N. B. Venkateswarulu, BS Publications.
3. Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education.
4. Unix Shells by Example, 4th Edition, Ellie Quigley, Pearson Education.
5. Sed and Awk, O. Dougherty & A. Robbins, 2nd edition, SPD.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22001-Analog and Digital Communications

L	T	P	C
3	-	-	3

B.Tech. II Year II Sem

Pre-requisite: 25EC21001- Signals and systems

Course Objectives: Develop ability to

1. Analyze system requirements of analog and digital communication systems.
2. Understand the generation, detection of various analog and digital modulation techniques.
3. Acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. Understand the concepts of baseband transmissions.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Analyze different analog modulation schemes with respect to their performance characteristics.	PO1, PO2, PO3, PSO1	I, II	3	4, 9, 11
CO2	Explain the concepts of base band data transmission and multiplexing schemes for transmission of multiple signals.	PO1, PO2, PO3, PSO1	III	3	
CO3	Analyze various digital modulation techniques	PO1, PO2, PO3, PSO1	IV	3	
CO4	Explain the concepts of Information Theory and analyze different Source coding and Error Control Coding Techniques.	PO1, PO2, PO3, PSO1	V	4	

UNIT - I

Amplitude Modulation:

Need for modulation, **Amplitude Modulation:** Time and frequency domain description, Generation — Switching modulator, Detection - Envelope detector, **DSB-SC Modulation:** Generation — Balanced Modulator, Detection- Synchronous detector, COSTAS Loop, **SSB Modulation:** Time and frequency domain description, Generation — Phase discrimination Method and Demodulation - coherent detection, Introduction to Vestigial side band modulation. Block diagram of AM Transmitter and AM Super heterodyne receiver (Qualitative Treatment only), Noise Analysis of various forms of AM.

UNIT - II

Angle Modulation:

Basic concepts of Phase Modulation, **Frequency Modulation:** Single tone frequency modulation, Spectrum Analysis, Carson's Rule, Generation of FM Waves- Armstrong Method, Detection of FM Waves - Phase locked loop, Comparison of FM and AM. Pre-emphasis and de-emphasis. Block diagram of FM Transmitter and FM Super heterodyne receiver (Qualitative Treatment only), Noise Analysis of Angle Modulation.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT – III

Base Band Data Transmission:

Requirements of a line encoding format, various line encoding formats - Unipolar, Polar, Bipolar, Inter symbol interference, Nyquist's criterion. Comparison of FDM and TDM. PCM Generation and Reconstruction, Uniform Quantization Noise, DPCM, DM and Adaptive DM.

UNIT - IV

Digital Modulation Techniques:

Digital Modulation formats, Coherent binary modulation techniques (BPSK, BFSK), Coherent quadrature modulation techniques (QPSK), Non-Coherent binary modulation techniques (BFSK, DPSK), QAM, M-ary modulation techniques (PSK, FSK, QAM), Comparison of M-ary digital modulation techniques, power spectra, bandwidth efficiency, constellation diagrams.

UNIT – V

Information theory:

Entropy, Information rate, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade-off between bandwidth and SNR.

Source coding: Huffman coding, Shannon Fan coding, Channel coding - Linear block codes and cyclic codes.

TEXT BOOKS:

1. Digital and Analog Communication System – K. Sam Shanmugam, Wiley, 2019.
2. Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha, 3rd Edition, McGraw-Hill, 2008.
3. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, PHI, 2009.

REFERENCES:

1. Electronic Communications – Dennis Roddy and John Coolean, 4th Edition, PEA, 2004
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH, 2004
3. Communication System - Simon Haykin and Michael Moher, Wiley, 5th edition, 2022

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22002 - Linear and Digital IC Applications

B.Tech. ECE - II Year II Sem.

L	T	P	C
3	-	-	3

Pre-requisite(s): 25EC21002 - Digital Logic Design,
25EC21003 - Electronic Circuit Analysis

Course Objectives: Develop ability to

1. Understand the characteristics of Operational Amplifier; Design of differential amplifier, instrumentation amplifier, differentiators, integrators.
2. Understand the design of Monostable and Astable Multivibrators using IC 555 timer for the given specifications; and design of active filters for the given specifications.
3. Understand the functionality of op-amp based data converters.
4. Understand the functionality of different Combinational Logic ICs.
5. Understand the functionality of different Sequential Logic ICs.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Design op-amp based circuits viz. differential amplifier, instrumentation amplifier, differentiator, integrator	PO1, PO2, PO3 and PSO1	I	3	4
CO2	Design Monostable and Astable Multivibrators using IC 555 timer for given specifications; Explain the functionality of IC 565 PLL; Design active filters for given specifications.	PO1, PO2, PO3 and PSO1	II	3	
CO3	Analyze the functionality of op-amp based data converters.	PO1, PO2, PO3 and PSO1	III	3	
CO4	Explain the functionality of different Combinational Logic ICs.	PO1, PO2, PO3 and PSO1	IV	3	
CO5	Explain the functionality of different Sequential Logic ICs.	PO1, PO2, PO3 and PSO1	V	3	

UNIT – I

Operational Amplifier:

Ideal and Practical Op-Amp Characteristics, Features of 741 Op- Amp, Modes of Operation:

Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT – II

Active Filters and Waveform Generators, IC-555 & IC565 Applications:

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters.

Waveform Generators – Triangular, Sawtooth, Square Wave

IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications.

IC565 PLL - Block Schematic, principle and Applications.

UNIT – III

Data Converters:

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT – IV

Combinational Logic ICs:

Specifications and Applications of TTL-74XX Series ICs: Decoders (IC74138), Priority Encoders (IC74148), Multiplexers (IC74151), Parallel Binary Adder cum Subtractor (IC74283), Magnitude Comparators (IC7485).

UNIT – V

Sequential Logic ICs:

Familiarity with commonly available 74XX Series ICs: D- Flip-flops (IC7474), JK Flip-Flop (IC74112), Synchronous Counters (74163), Asynchronous Counters (IC7493), and Universal Shift Registers (IC74194).

Text Books:

1. Op-Amps & Linear ICs– Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals –Floyd and Jain, Pearson Education, 8th Ed., 2005.

Reference Books:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Digital Design Principles and Practices–John. F. Wakerly, Pearson 3rd Ed., 2009.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC2203 - Probability Theory and Stochastic Processes

B.Tech. II Year II Sem

Pre-requisite: 25MA11001-Matrices and Calculus

L	T	P	C
3	-	-	3

Course Objectives: Develop ability to:

1. Understand the concept of random variables and their classification.
2. Comprehend the significance of distribution and density functions of random variable.
3. Interpret the principle of joint random variables and computation of their statistical parameters.
4. Realize the concept of a random process and its analysis in both time and frequency domains.
5. Understand the effect of an LTI system on its random excitation.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Determine the applications of various random variables based on individual CDF and PDF.	PO1, PO2	I, II	2	SDG4
CO2	Compute various statistical averages of single/multiple random variables and demonstrate their significance.	PO1, PO2	III	2	
CO3	Analyze a random variable as a function of time, with reference to its temporal and spectral characteristics.	PO1, PO2	IV	4	
CO4	Analyze the effect of an LTI system on the time domain and frequency domain characteristics of the random excitation.	PO1, PO2	V	4	

UNIT - I

Probability: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

Random Variables:

Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT - II

Operations on single Random Variable:

Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random variable - Monotonic and Non-monotonic Transformations of Continuous and Discrete random Variable, Computer generation of a Random Variable of a given PDF/CDF.

UNIT - III

Multiple random variables and Operations on Multiple random variables: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density– Point and Interval conditioning, Statistical Independence, Sum of Two and more Random Variables, Central Limit Theorem, Equal and Unequal Distribution (Proof not expected).

Expected Value of a Function of Random Variables- Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV

Random processes -Temporal characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide- Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean- Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross- Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response — Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT-V

Random processes – Spectral characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

Noise sources: Resistive / Thermal Noise Source, Arbitrary noise sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

TEXTBOOKS:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles - TMH, 4th Edition
2. Murray R Spiegel, John Schiller, R Alu Srinivasan. – Probability and Statistics – Schaum's Outlines, 2nd Edition, TMH

REFERENCE BOOKS:

1. Athanasios Papoulis and S. Unnikrishnan Pillai - Probability, Random Variables and Stochastic Processes — McGraw Hill Education, 4th Edition
2. Taub and Schilling - Principles of Communication systems by (TMH), 2008

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22004-Electromagnetic Fields and Transmission Lines

B.Tech. II Year II Sem.

Pre-requisite(s): 25MA11001-Matrices and Calculus

25MA12001-Ordinary Differential Equations and Vector
Calculus

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop ability to

1. Learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields and apply them to solve physics and engineering problems.
2. Distinguish between static and time-varying fields and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. Analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. Analyze the propagation of waves in transmission line and be able to solve transmission line problems using Smith Chart.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Explain the concepts and solve problems related to Electrostatic Fields and Magneto static Fields.	PO1, PO2, PO3, PSO1	I, II	3	4, 9, 11
CO2	Differentiate the static and time-varying EM fields and apply Maxwell's Equations at different Boundaries.	PO1, PO2, PO3, PSO1	III	3	
CO3	Classify conductors and dielectric materials and analyze the Wave Propagations in those mediums.	PO1, PO2, PO3, PSO1	IV	3	
CO4	Solve transmission line problems numerically and use smith charts.	PO1, PO2, PO3, PSO1	V	3	

UNIT- I

Electrostatics:

Review of Coordinate Systems & Vector Calculus, Coulomb's Law, Electric Field Intensity — Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and its applications, Electric Potential, Relation between E and V, Maxwell's Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Linear, Isotropic and Homogeneous Dielectrics,

Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitors—Parallel Plate, Coaxial, Spherical.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

UNIT-II

Magnetostatics:

Biot-Savart's Law, Ampere's Circuit Law and its applications, Magnetic Flux Density, Maxwell's equations for Magneto-static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT-III

Maxwell's Equations (Time Varying Fields):

Faraday's Law, Transformer and Motional EMF, Inconsistency in Ampere's Law and Displacement Current Density, Maxwell's Equations in Differential, Integral and Phasor form.

Electric and magnetic Boundary Conditions (Dielectric – Dielectric, Conductor– Dielectric, Conductor– Free Space interfaces).

UNIT-IV

EM Wave Characteristics:

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves– Definitions, Relation between E&H, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics — Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Skin Depth, Surface Impedance, Wave Polarization. Poynting Vector and Poynting Theorem.

Reflection and Refraction of Plane Waves — Normal Incidences for both Perfect Conductor and Perfect Dielectrics, Oblique Incidences for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection.

UNIT-V

Transmission Lines:

Types, Parameters, Equivalent Circuit, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless Lines, Types of Distortions, condition for Distortion less transmission lines, Minimum Attenuation, Loading — Types of Loading, Input Impedance, SC and OC Lines, Reflection Coefficient, VSWR, Impedance Transformations - $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Smith Chart- Configuration and Applications, Single Stub Matching.

TEXT BOOKS:

1. Engineering Electromagnetics— William H. Hayt Jr. and John A. Buck, 8th Ed., Mc. Graw Hill, 2014
2. Principles of Electromagnetics – Matthew N.O. Sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Asian Edition, 2015.

REFERENCES:

1. Electromagnetic Waves and Radiating Systems–E.C. Jordan and K.G. Balmain, 2nd Ed., PHI,2000.
2. Engineering Electromagnetics — Nathan Ida, 2nd Ed., Springer (India) Pvt. Ltd.,New Delhi, 2005.
3. Electromagnetic Field Theory Fundamentals – Bhag Singh Guru and Huseyin R. Hiziroglu, Cambridge University Press, 2nd Ed., 2006.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22005 - Control Systems

B. Tech. ECE- II Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): 25EC21001 -Signals and Systems
25EC21004 - Network Analysis and Synthesis
25MA12001 - Ordinary Differential Equations and Vector Calculus

Course Objectives: Develop ability to:

1. To introduce the fundamental concepts, classifications, and mathematical modeling of control systems for mechanical and electrical domains.
2. To analyze control system behavior in time and frequency domains and stability criteria using root locus, Bode plot, Nyquist plot, etc.
3. Design and evaluate compensators and controllers to improve system performance.
4. Explain state-space representation, solution of state equations, and assess system Controllability and observability.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Describe open- and closed-loop systems, and develop mathematical models using block diagrams and signal flow graphs.	PO1, PO2, PO3, PSO1	I	3	4
CO2	Analyze time response of second-order systems using time-domain specifications, and assess stability using Routh-Hurwitz criterion and root locus techniques	PO1, PO2, PO3, PO4, PO5, PSO1	II	3	
CO3	Analyse frequency response plots including Bode, Polar, and Nyquist plots, and investigate system stability.	PO1, PO2, PO3, PO4, PO5, PSO1	III	3	
CO4	Design compensators and controllers to meet specific performance criteria in control systems.	PO1, PO2, PO3, PO4, PO5, PSO1	IV	3	
CO5	Apply the state-variable approach and analyze controllability and observability.	PO1, PO2, PO3, PO4, PO5, PSO1	V	3	

UNIT –I

Control System fundamentals: Classification of control systems, Open and Closed loop systems. Mathematical modelling of mechanical systems and their conversion into electrical systems. Block diagram reduction and Signal flow graphs.

UNIT –II

Time response Analysis: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, Routh - Hurwitz criterion for stability.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

UNIT –III

Frequency response Analysis: Frequency domain specifications, bode plots, Gain margin and Phase Margin. Polar plot, Nyquist plot, and Nyquist criterion for stability.

UNIT –IV

Compensators and controllers: Introduction to compensators, Lag compensator, Lead compensator, Lag- Lead compensator, Design of compensators using bode plot. Introduction to controllers, P, I, D, PI, PD, PID controllers.

UNIT –V

State space representation: Concept of state and state variables. State models of linear time invariant systems, State transition matrix, Solution of state equations. Controllability and observability.

Text Books:

1. I.J. Nagrath and M. Gopal, Control System Engineering, 5ed., New Age Publishers, 2009.
2. B.C.Kuo, Automatic Control Systems, 7th Edition, PHI, 2003

Reference Books:

1. K. Ogata, Modern Control Engineering, 2ed., Prentice Hall, 2010.
2. A.K. Jairath, Solutions and Problems of Control Systems, CBS Publishers, 2013.
3. A. Nagoor Kani, Control Systems, 2ed., RBA Publications, 2007.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS22007–Python Programming

B. Tech. ECE -II Year II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives: Introduce the fundamentals of Python programming for problem-solving.

1. Develop skills to write structured, modular, and efficient Python code.
2. Enable students to use Python's built-in data structures and libraries effectively.
3. Provide knowledge on file handling, exception handling, and object-oriented programming in Python.
4. Equip students with the ability to apply Python for real-world applications including data processing and automation.

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

CO	Course Outcomes	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	Write Python programs using variables, operators, expressions, and control structures.	PO1,2,3,4,5,6,9,11, PSO1,2	I	2	4, 8, 9, 11
CO2	Implement Python programs using built-in data structures like lists, tuples, sets, and dictionaries.	PO1,2,3,4,5,6,9,11, PSO1,2	II	3	
CO3	Apply modular and object-oriented programming principles in Python.	PO1,2,3,4,5,6,7,9,11, PSO1,2	III	4	
CO4	Handle files, exceptions, and apply Python libraries for problem-solving.	PO1,2,3,4,5,6,7,9,11, PSO1,2	IV	3	
CO5	Develop small-scale applications in Python for automation and data manipulation.	PO1,2,3,4,5,6,7,8,9,11, PSO1,2	V	6	

UNIT - 1

Introduction to Python and Basics of Programming:

Introduction to Python: Features, Applications, Installation, IDEs, Python Syntax, Indentation, Comments, Variables, Data Types, Type Casting, Operators: Arithmetic, Relational, Logical, Assignment, Membership, Identity, Bitwise, Input/Output functions (input(), print()), Control Structures: if, if-else, if-elif-else, Nested Conditions, Looping: for, while, Nested Loops, break, continue, pass.

UNIT-2

Data Structures in Python:

Strings: Creation, Indexing, Slicing, Methods, String Formatting, Lists: Creation, Indexing, Slicing, List Comprehension, Methods, Tuples: Properties, Indexing, Methods, Sets: Creation, Operations, Methods, Dictionaries: Creation, Access, Methods, Dictionary

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Comprehension, Iterating over data structures.

UNIT-3

Functions and Modules:

Functions: Defining, Calling, Parameters, Return Values, Types of Arguments: Positional, Keyword, Default, Variable Length, Scope of Variables: Local and Global, Lambda Functions, Map, Filter, Reduce, Recursion in Python, Modules: Importing, Creating User-defined Modules, Standard Modules (math, random, datetime), Packages in Python.

UNIT-4

File Handling and Exception Handling:

File Handling: Opening, Reading, Writing, Appending, File Modes, File Methods, Working with CSV and JSON Files, Exception Handling: try, except, else, finally, Built-in Exceptions, Raising Exceptions, Introduction to Regular Expressions (re module).

UNIT-5

Object-Oriented Programming and Applications:

OOP Basics: Classes, Objects, Attributes, Methods, Constructor (__init__), self keyword, Inheritance: Single, Multiple, Multilevel, Hierarchical, Method Overriding, Method Overloading (conceptual), Encapsulation and Polymorphism, Application Development: Data Processing Script, Basic Calculator, File Organizer, Simple Data Analysis with pandas.

TEXTBOOKS:

1. Python Programming: Using Problem Solving Approach by Reema Thareja.
2. Python Crash Course by Eric Matthes, Learning Python by Mark Lutz.

REFERENCEBOOKS:

1. Introduction to Python Programming by Gowrishankar S., Veena A.
2. Python Cookbook by David Beazley and Brian K. Jones.
3. Fluent Python by Luciano Ramalho, Automate the Boring Stuff with Python by Al Sweigart.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22L01-Analog and Digital Communications Lab

B.Tech. II Year II Sem

L	T	P	C
-	-	2	1

Prerequisite(s): None

Course Objectives: Develop ability to

1. Implement and analyze different analog and digital communication systems
2. Acquire practical knowledge of different pulse modulation techniques and multiplexing.
3. Acquire practical knowledge of different digital modulation techniques.

Course outcomes: At the end of the course the student would be able to:

CO	Course Outcomes	Related POs and PSOs	Related Expts.	BTL	Related SDGs
CO1	Implement and analyze various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals.	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	1-4	3	4, 9, 11
CO2	Implement and analyze various Pulse modulation and demodulation Techniques	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	6-8	3	
CO3	Analyze the concepts of Frequency Division Multiplexing and implement the same	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	5	3	
CO4	Implement and analyze various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically.	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	9-12	3	

Note:

- Minimum 10 experiments should be conducted.
- All these experiments are to be simulated first either using MATLAB/Scilab, Commsim or any other simulation package and then to be realized in hardware.

List of Experiments:

1. Generate Amplitude modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
2. Generate Frequency modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
3. Generate modulated and demodulate DSB-SC Signal for different modulation indices and plot the corresponding waveforms and their spectrum. Compare the modulation

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

index theoretically and practically

4. Generate and demodulate SSB-SC modulated Signal (Phase Shift Method) for different modulation indices and plot the corresponding waveforms and their spectrum. Also calculate theoretically and practically the modulation index in each case
5. Demonstrate the Frequency Division Multiplexing & Demultiplexing practically by transmitting at least 4 different signals simultaneously with respect to time and recovering without distortion.
6. Design and implement a Pulse Amplitude Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
7. Design and implement a PWM and PPM Modulator & Demodulator Circuits using 555 timer and plot the corresponding waveforms from the practical observations
8. Generate PCM Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations
9. Generate Delta Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
10. Generate FSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
11. Generate practically Binary PSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
12. Generate practically DPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.

Equipment/software required:

1. Computer Systems
2. MATLAB Software
3. DSOs (0-20 MHz /50 MHz)
4. Functions Generators (0 – 1MHz)
5. Multimeters/Voltmeters
6. Trainer kits of the experiments

Note: Not limited to the above experiments. Students can perform any extra experiments of the course as per their interest.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22L02 - Linear and Digital IC Applications Lab

B.Tech. ECE - II Year, II Sem.

L	T	P	C
-	-	2	1

Prerequisite(s): 25EC21L01 - Digital Logic Design Laboratory
25EC21L02 - Electronic Circuit Analysis Laboratory

Course Objectives: Develop ability to

1. Identify various electronic components and understand their specifications.
2. Understand and operate various electronic measuring instruments.
3. Understand the characteristics of diode, and its applications in rectifier and voltage regulator.
4. Understand the characteristics of BJT and FET, and their application in amplifier circuits.
5. Understand the procedure for biasing of BJT.
6. Understand the procedure to simulate electronic circuits using various software tools.

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

CO	Course Outcomes	Related POs and PSOs	Related Expts.	BTL	Related SDGs
CO1	Design and implementation of various analog circuits using 741 ICs.	PO1, PO2, PO8, PO9, PSO1, PSO2	Expt. 1 - 7	3	4
CO2	Design and implementation of various Multivibrators using 555 timer	PO1, PO2, PO8, PO9, PSO1, PSO2	Expt. 8 - 9	3	
CO3	Design and implement Data Converters and Voltage Regulators.	PO1, PO2, PO8, PO9, PSO1, PSO2	Expt. 10 - 11	3	
CO4	Design and implement various circuits using digital ICs	PO1, PO2, PO8, PO9, PSO1, PSO2	Expt. 12- 18	3	

Note:

- Minimum of 12 experiments should be conducted taking 8 from Part A and 4 from Part B

List of Experiments:

Part – A: Linear ICs

1. Design and Verify an Inverting and Non-inverting Amplifier using IC741.
2. Design and Verify Summing Amplifier and Subtractor Circuit using IC741.
3. Design and Verify Comparator Circuit using Op-Amp IC741. Draw the comparison results of $A=B$, $A<B$, $A>B$.
4. Design and Verify the operation of Integrator and Differentiator Circuits using IC741.
5. Design Active LPF and Active HPF for the given cut-off frequency and gain.
6. Design waveform generators for the given frequency of oscillations using IC741:
(a) Square Wave (b) Triangular Wave
7. Design a Schmitt Trigger Circuit using IC741, and find its LTP and UTP.
8. Design and verify Mono-stable Multivibrator using IC555 for the given pulse width.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

9. Design and verify Astable Multivibrator using IC 555 for the given time period and duty cycle.
10. Design and verify the operation of Voltage Regulator using IC723/ IC 7805/ IC7912 and find its load regulation.
11. Design and verify the operation of R-2R ladder type DAC and find its resolution and write a truth table with respective voltages.
12. Design Parallel comparator type/counter type / successive approximation ADC and find its efficiency

Part – B: Digital ICs

13. Verify the operation of priority encoder using IC74148.
14. Verify the operation of 3 to 8 Line Decoder IC74138.
15. Verify the operation of 8x1multiplexer using IC74151.
16. Design a 4-bit Adder Cum Subtractor Circuit using Adder IC74283 and XOR gate IC7486. Verify the operation.
17. Verify the operation of Asynchronous Counter IC7493.
18. Verify the operation of Synchronous Counter IC74163.
19. Verify the operation of 4-bit Universal Shift Register IC74194.

Hardware Requirements:

8. IC Trainer Kits.
9. Function Generator: 0-1 MHz
10. Multimeters/ Voltmeters:
11. Cathode Ray Oscilloscope (CRO) : 0-20 MHz
12. Breadboards and Connecting Wires
13. Components:
 - a) IC 741, 555, 723, 7805, 7912.
 - b) Resistors, Capacitors, Diodes
 - c) IC 74138, 74148, 74151, 74283, 7486, 7493, 74163, 74194

Note: Not limited to the above experiments. Students can perform any extra experiments of the course as per their interest.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25EC22L03- Modelling & Simulation Lab

L	T	P	C
-	-	2	1

B.Tech. II Year II Sem.

Prerequisite(s): None

Course Objectives: Develop ability to

1. Understand the principle/s involved in the simulation of process for generating various signals/sequences, synthesizing them and applying various transformations on signals
2. Realize the process involved in the simulation of the study of the characteristics of an LTI system and in finding its response under various excitations.
3. Understand various principles involved in the simulation of transform domain representation of a given signal.
4. Understand the process of simulating various similarity measures between signals /sequences.
5. Understand the computation of various moments of a random variable through simulation.

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

CO	Course Outcomes	Related POs and PSOs	Related Expts.	BTL	Related SDGs
CO1	Synthesize a given waveform in terms of standard test signals and sequences and apply various transformations on dependent/ independent variables of the given signal/s.	PO1, PO2, PO3, PO4, PO5, PO6, PO7	1,2,12	5	9
CO2	Explain the principles of system classification, using its characteristics in time and frequency domain representations	PO1, PO2, PO3, PO4, PO5, PO6, PO7	3,4,5	2	
CO3	Express the given time domain signal in frequency domain and explain the respective Magnitude and Phase characteristics	PO1, PO2, PO3, PO4, PO5, PO6, PO7	6,7,8,9	2	
CO4	Demonstrate the applications of Auto/Cross correlation in signal processing.	PO1, PO2, PO3, PO4, PO5, PO6, PO7	3, 13,14	3	
CO5	Explain the significance of statistical averages of a random variable	PO1, PO2, PO3, PO4, PO5, PO6, PO7	10,11	3	

List of Experiments:

Note:

- All the experiments are to be conducted using MATLAB or equivalent software
- Minimum of 12 experiments are to be completed / simulated.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Signals and Systems (Minimum 7 Experiments)

1. Write the code / script for generating various standard viz: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Sawtooth, Triangular, Sinusoidal, Ramp, Sinc and Nonstandard Signals and Sequences generated from these standard signals /sequences using Waveform synthesis. Also, for perform different operations viz: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power on them.
2. Write the code / script for finding the Even and Odd parts of Signal / Sequence and Real and Imaginary parts of Signal.
3. Write the code / script for finding the output of a System for a given input and Impulse Response and finding Auto Correlation and Cross Correlation of Signals / sequences
4. Write the code / script for Verifying whether a given Continuous/Discrete System is Linear, Time Invariant, Stable and Physically Realizable
5. Write the code / script for obtaining Sinusoidal response and Impulse response of a given Continuous / Discrete LTI System.
 - a) Plot the Real and Imaginary part and
 - b) Magnitude and Phase Plot of the response
6. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Fourier Transform by using the properties where ever required.
7. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Laplace Transform by using the properties where ever required. Also plot pole-zero diagram in S-plane
8. Write the code/ script for finding and plotting the Magnitude and Phase Spectrum of any given Sequence by finding its Z-Transform by using the properties wherever required. Also plot pole — zero diagram in Z-plane
9. Gibbs Phenomenon and waveform synthesis

Probability Theory and Stochastic Processes (Minimum 3 Experiments)

10. Write the code / script for generating various Random Variables with different CDFs/ PDFs
11. Write the code / script for generating Gaussian noise and for finding its mean, Skewness, Kurtosis, PDF and PSD.
12. Write the code / script for Verifying Sampling theorem for different sampling rates, Sampling types and Duty Cycles and for plotting the sampled and reconstructed Signals.
13. Write the code / script for Removal of noise from the signal using Cross correlation.
14. Write the code / script for Extraction of Periodic Signal masked by noise using Auto Correlation

Note: Not limited to the above experiments. Students can perform any extra experiments of the course as per their interest.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS22L07–Python Programming Lab

B. Tech. ECE -II Year II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives: Introduce the fundamentals of Python programming for problem-solving.

1. To install and run the Python interpreter.
2. To learn control structures.
3. To Understand Lists, Dictionaries in Python.
4. To Handle Strings and Files in Python.

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

CO	Course Outcomes	Related POs and PSOs	Mapped Experiments	BTL	Related SDGs
CO1	Develop the application specific codes using python.	PO1,2,3,4,5,6,9,11, PSO1,2	1,2,3,4,5,6,7,28,36	3	4, 8, 9,11
CO2	Understand Strings, Lists, Tuples and Dictionaries in Python	PO1,2,3,4,5,6,9,11, PSO1,2	10,11,12,13,14,15,16,17,18	2	
CO3	Verify programs using modular approach, file I/O, Python standard library	PO1,2,3,4,5,6,7,9,11, PSO1,2	19,22,23,29,30,31,32,33,34	4	
CO4	Implement Digital Systems using Python	PO1,2,3,4,5,6,7,9,11, PSO1,2	21,24,25,26,27,35	3	

Note: The lab experiments will be like the following experiment examples.

LIST OF EXPERIMENTS:

1.
 - I. Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
 - II. Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. Write a program to calculate compound interest when principal, rate and number of periods are given.
4. Read the name, address, email and phone number of a person through the keyboard and print the details.
5. Print the below triangle using for loop.


```

5
4 4
3 3 3
2 2 2 2
1 1 1 1 1
```
6. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

7. Python program to print all prime numbers in a given interval (use break)
8. Write a program to convert a list and tuple into arrays.
9. Write a program to find common values between two arrays.
10. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.
11. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
12. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
13. Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
14. The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
15. Write a python code to read dictionary values from the user. Construct a function to invert its content i.e., keys should be values and values should be keys.
16. Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
17. Remove the given word in all the places in a string?
18. Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
19. Writes a recursive function that generates all binary strings of n-bit length
20. Write a python program that defines a matrix and prints
21. Write a python program to perform multiplication of two square matrices
22. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
23. Use the structure of exception handling all general-purpose exceptions.
24. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
25. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
26. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
27. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
28. Write a python code to read a phone number and email-id from the user and validate it for correctness.
29. Write a Python code to merge two given file contents into a third file.
30. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
31. Write a Python code to Read text from a text file, find the word with most number of occurrences
32. Write a function that reads a file file1 and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.
33. Import numpy, Plotpy and Scipy and explore their functionalities.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

34. Install Num Pypackage with pip and explore it.
35. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
36. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland.
2. Learning Python, Mark Lutz, O'reilly.

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Introduction to Python Programming, Gowrishakar S, Veena A, CRC Press
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Python for Data Science, Dr. Mohd Abdul Hameed, Wiley publications
6. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press
7. Introduction to Python, Gowrishankar S, Veena A., CRC Press

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
 Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

25CS22SD6–Web and Mobile Applications

B. Tech. ECE -II Year II Sem.

L	T	P/D	C
-	-	2/-	1

Prerequisite(s): None

Course Objectives

1. Learn the basics of web development, including HTML, CSS, and JavaScript.
2. Understand the fundamentals of mobile application development for Android and Web platforms.
3. Be able to create and deploy web applications using front-end and back-end technologies.
4. Gain hands-on experience in developing responsive websites and mobile applications.
5. Understand the integration of databases with web/mobile applications.
6. Develop problem-solving skills in building functional, user-friendly applications.

Course Outcomes: Upon completing this course, the students will be able to

1. Design responsive web pages using HTML, CSS, and JavaScript.
2. Develop interactive mobile applications for Android using basic Android development tools.
3. Create dynamic web applications using front-end and back-end technologies.
4. Implement data handling and database management in web and mobile applications.
5. Debug and troubleshoot common issues in web and mobile applications.
6. Deploy applications on a local server or cloud environment for real-time access.

Lab Program (11 Weeks)

Week 1: Introduction to Web Development

- **Objective:** Introduction to Web Development concepts, tools, and languages (HTML, CSS).
- **Tasks:**
 - Design a basic webpage using HTML.
 - Apply styling using CSS to improve page appearance (colors, fonts, layouts).
 - Understand the structure of a webpage (HTML tags, CSS selectors).

Week 2: Advanced Web Page Design (HTML and CSS)

- **Objective:** Learn more complex web layouts and CSS styling.
- **Tasks:**
 - Create a webpage with multiple sections (header, footer, navigation bar).
 - Use CSS Grid/Flexbox for layout management.
 - Implement a simple form with input validation.

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

Week 3: Introduction to JavaScript for Interactivity

- **Objective:** Use JavaScript to add interactivity to a webpage.
- **Tasks:**
 - Learn basic JavaScript syntax (variables, loops, functions).
 - Implement event handling (onclick, onmouseover, etc.).
 - Create a simple interactive quiz or calculator using JavaScript.

Week 4: Responsive Web Design

- **Objective:** Build a responsive web page using media queries.
- **Tasks:**
 - Create a webpage that adjusts its layout based on the screen size (desktop, tablet, mobile).
 - Apply the concept of mobile-first design and media queries in CSS.

Week 5: Introduction to Android Application Development

- **Objective:** Set up the development environment for Android app development using Android Studio.
- **Tasks:**
 - Create a "Hello World" Android app.
 - Learn about Android UI components (TextView, Button, EditText, etc.).
 - Handle basic user inputs (Button clicks, Text inputs).

Week 6: Android App Layouts and Views

- **Objective:** Develop layouts and UI components for Android applications.
- **Tasks:**
 - Create simple layouts using LinearLayout, RelativeLayout, and ConstraintLayout.
 - Add UI elements such as Buttons, TextViews, and ImageViews to the Android app.

Week 7: Android Intents and Navigation

- **Objective:** Learn how to navigate between different activities in Android apps.
- **Tasks:**
 - Implement explicit and implicit Intents in Android.
 - Create a multi-screen app (navigation from one screen to another).

Week 8: Web Application Development (Frontend with JavaScript & Backend Integration)

- **Objective:** Introduction to dynamic web applications.
- **Tasks:**
 - Set up a basic Node.js application.

**GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)**

(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with 'A+')
Cheeryal (V), Keesara (M), Medchal Dist., Telangana - 501 301

- Implement basic front-end interactivity using JavaScript and connect it with a backend server.
- Create a small dynamic application (e.g., a simple blog or todo list app).

Week 9: Database Integration in Web Development

- **Objective:** Integrate a database with a web application for dynamic content.
- **Tasks:**
 - Set up a simple MySQL or MongoDB database.
 - Connect the backend of the web application to the database.
 - Perform basic CRUD operations (Create, Read, Update, Delete) in the web app.

Week 10: Android App with Database (SQLite)

- **Objective:** Use SQLite for local data storage in Android apps.
- **Tasks:**
 - Integrate SQLite into an Android application.
 - Perform CRUD operations within an Android app using SQLite database.

Week 11: Mobile App Design and Debugging

- **Objective:** Focus on design patterns and debugging for mobile applications.
- **Tasks:**
 - Implement basic design principles (Material Design) in the Android app.
 - Debug and test mobile applications using Android Studio's debugging tools.

Text Books:

- **HTML and CSS: Design and Build Websites**, Duckett, J. (2011). HTML and CSS: Design and Build Websites. Wiley. ISBN: 978-1118008188
- **JavaScript and JQuery: Interactive Front-End Web Development**, Duckett, J. (2014). JavaScript and JQuery: Interactive Front-End Web Development. Wiley. ISBN: 978-1118531648
- **Android Programming: The Big Nerd Ranch Guide**, Big Nerd Ranch (2020). Android Programming: The Big Nerd Ranch Guide (4th ed.). Pearson Education, ISBN: 978-0135245130.
- **Head First Android Development**, Sierra, K., & Bates, B. (2017). Head First Android Development. O'Reilly Media. ISBN: 978-1491974050
- **Node.js, MongoDB, and AngularJS Web Development**, Raj, K. (2014). Node.js, MongoDB, and AngularJS Web Development. Pearson Education. ISBN: 978-0133796587.