DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For UG –R22

B. TECH – ELECTRICAL & ELECTRONICS ENGINEERING

(Applicable for batches admitted from 2022-2023)

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

COURSE STRUCTURE

Year: I Semester: I

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
ES	22UEE01	Electrical Circuit Analysis - I	3	-	--	--	4	30	70	100	3
ES	22UCS01	Programming for Problem Solving using C	3	-	--	--	4	30	70	100	3
ES	22UME02	Engineering Drawing	1	-	4	--	5	30	70	100	3
HS	22UEN01	Communicative English	3	-	--	--	4	30	70	100	3
BS	22UMT01	Mathematics – I	3	-	--	--	4	30	70	100	3
ES	22UEE02	Electrical Engineering Workshop Lab	--	--	3	--	3	15	35	50	1.5
ES	22UEN02	English Communication Skills Laboratory	--	--	3	--	3	15	35	50	1.5
HS	22UCS02	Programming for Problem Solving Using C Laboratory	--	--	3	--	3	15	35	50	1.5
MC	22UCH03	Environmental Science	2	--	--	--	2	--	--	--	0
TOTAL			15	4	13	-	32	195	455	650	19.5

HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE-Open Elective, OC-Online Course

Year: I Semester: II

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
ES	22UEE03	Electrical Circuit Analysis - II	3	-	--	--	4	30	70	100	3
ES	22UCS04	Data Structures	3	-	--	--	4	30	70	100	3
ES	22UCS03	IT Workshop	1		4	--	5	30	70	100	3
HS	22UMT02	Mathematics - II	3	-	--	--	4	30	70	100	3
BS	22UPH01	Applied Physics	3	-	--	--	4	30	70	100	3
ES	22UCS06	Data Structures in C Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UEE04	Electrical Circuits Laboratory	--	--	3	--	3	15	35	50	1.5
HS	22UPH02	Applied Physics Laboratory	--	--	3	--	3	15	35	50	1.5
MC	22UEN03	Constitution of India	2	--	--	--	2	--	--	--	0
OC	22UOC01	SWAYAM, NPTEL, Spoken Tutorials	-	-	-	2	2	-	-	-	0
TOTAL			15	4	13	2	34	180	420	600	19.5

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS)
EEE - UG – R22

Year: II Semester: I

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
PCC	22UEE08	Electro Magnetic Fields	3	-	--	--	4	30	70	100	3
PCC	22UEE09	Power Systems-I	3	-	--	--	4	30	70	100	3
PCC	22UEE10	DC Machines and Transformers	3	-		--	4	30	70	100	3
ES	22UEC03	Electronic Devices and circuits	3	-	--	--	4	30	70	100	3
ES	22UCS26	OOPS through JAVA	3	-	--	--	4	30	70	100	3
MC	22UEN08	Value Education	2	--	--	--	2	30	70	100	0
ES	22UEC04	Electronic Devices and Circuits Lab	--	--	3	--	3	15	35	50	1.5
ES	22UCS27	Oops through JAVA Lab	--	--	3	--	3	15	35	50	1.5
PCC	22UEE11	DCM&TF Lab	--	--	3	--	3	15	35	50	1.5
SOC	22UEE12	Skill Course in MATLAB SIMULINK	--	--	3	--	3	--	50	50	2
TOTAL			17	5	12	-	34	240	560	800	20.5

Year: II Semester: II

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
HS	22UMT03	Mathematics-III	3	-	--	--	4	30	70	100	3
ES	22UEE13	Induction Motors and Synchronous Machines	3	-	--	--	4	30	70	100	3
ES	22UEE14	Power Systems-II	3	-		--	4	30	70	100	3
ES	22UEE15	Control Systems	3	-	--	--	4	30	70	100	3
ES	22UEC05	Switching Theoryand Logic Design	3	-	--	--	4	30	70	100	3
MC	22UEN04	Essence of Indian Traditional Knowledge	2	--	--	--	2	30	70	100	0
ES	22UEE16	Induction Motors and Synchronous Machines Lab	--	--	3	--	3	15	35	50	1.5
ES	22UEC06	Switching Theory and Logic Design Lab	--	--	3	--	3	15	35	50	1.5
ES	22UEE17	Control Systems and Simulation Lab	--	--	3	--	3	15	35	50	1.5
SC	22UEN09	Skill Course (Employability Skills)	3	--	3	--	6	--	50	50	3
CSP	22UCSP1	Community Service Project	-	-	-				100	100	4
Internship-II for 2 Months (Mandatory) during summer vacation											
TOTAL			17	5	12	-	34	240	560	800	26.5

HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE-Open Elective, OC-Online Course, SC-Skill Course, CP-Community service Project, SI-Summer Internship, SP-Social Relaent Project, TS-Technical Seminar, PW-Project Work

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA
(AUTONOMOUS)
EEE - UG – R22

Year: III Semester: I

Category	Course Code	Course Title	Theory/ Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Creits
PCC	22UEE18	Power Electronics	3	0	0	--	3	30	70	100	*3*
PCC	22UEE19	Electrical Measurements and Instrumentation	3	0	0	--	3	30	70	100	3
PCC	22UEE2	Power system Analysis	3	0	0	--	3	30	70	100	3
OE-I	22UEE21	Fundamentals of Power Electronics	3	0	0	--	3	30	70	100	3
OE-I	22UEE22	Concepts of Control Systems	3	0	0	--	3	30	70	100	
OE-I	22UEE23	Optimization Techniques	3	0	0	--	3	30	70	100	
OE-I	22UEE24	Renewable Energy Sources	3	0	0	--	3	30	70	100	
PE-I	22UEC10	Analog Communications	3	0	0	--	3	30	70	100	3
PE-I	22UEC16	Analog and Digital Integrated Circuits	3	0	0	--	3	30	70	100	
PE-I	22UEC07	Signals & Systems	3	0	0	--	3	30	70	100	
PE-I	22UNP01	NPTEL/ Swayam Course (12 Weeks)									
PCC	22UEE25	Electrical Measurements & Instrumentation Lab	0	0	3	--	3	30	70	100	1.5
PCC	22UEE26	Power Electronics Lab	0	0	3	--	3	30	70	100	1.5
SOC	22UEN11	Advanced English Communication Skills	2	0	0	-	2	-	50	50	2
PROJ	22UOC02	Summer Internship 2 months (mandatory) after Second Year(To be Evaluated during V Semester)									1.5
TOTAL											21.5
HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE- Open Elective, OC-Online Course											

Year: III Semester: II

Category	Course Code	Course Title	Theory / Lecture (L)	Tutorial(T)	Practical/ Drawing (P)	Self-Study (SS)	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
PCC	22UEE27	Switch gear and Protection	3	0	0	--	3	30	70	100	3
PCC	22UEE28	Electric Drives	3	0	0	--	3	30	70	100	3
PCC	22UEC41	Microprocessors & Microcontrollers	3	0	0	--	3	30	70	100	3
OE-II	22UEE30	Fundamentals of Utilization of Electrical Energy	3	0	0	--	3	30	70	100	3
OE-II	22UEE31	Battery Management Systems and Charging stations	3	0	0	--	3	30	70	100	
OE-II	22UEE32	Electrical safety	3	0	0	--	3	30	70	100	
PE-II	22UEE33	Analog Control Systems	3	0	0	--	3	30	70	100	3
PE-II	22UEC39	VLSI Design	3	0	0	--	3	30	70	100	
PE-II	22UEC17	Digital Signal Processing	3	0	0	--	3	30	70	100	
PE-II	22UNP02	NPTEL/ Swayam Course (12 Weeks)	-		1	--	1		0	0	
PCC	22UEC45	Microprocessors and Microcontrollers Lab	0	0	3	--	3	30	70	100	1.5
PCC	22UEE35	Power System and Simulation Lab	0	0	3	--	3	30	70	100	1.5
PCC	22UEC48	IoT and its applications Lab	0	0	3	--	3	30	70	100	1.5
MC	22UEN12	Mandatory Course -- Research Methodology	2	0	0	-	2	-	-	-	0
SC	22UCS28	Skill Course- Python Programming Lab	1	0	3	-	4	0	50	50	2
TOTAL			14	00	11	0	25	270	630	900	21.5
HS-Humanities & Sciences, BS-Basic Sciences, ES-Engineering Sciences, MC-Mandatory Course, PC-Professional Core, PE-Professional Elective, OE- Open Elective, OC-Online Course											

Year & Sem	I Year – I Semester					
Course Code	22UEE01	L	T	P	SS	C
Course Name	Electrical Circuit Analysis - I	3	1	0	0	3

COURSE OBJECTIVES

1. To study the concepts of passive elements, types of sources and various network reduction techniques.
2. To study the concept of magnetic coupled circuit.
3. To understand the behaviour of RLC networks for sinusoidal excitations
4. To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
5. To understand the applications of network theorems for analysis of electrical networks.

COURSE OUTCOMES

CO1: Various electrical networks in presence of active and passive elements.
CO2: Analyze the Magnetic Circuits
CO3: Analyze the circuits in Single phase AC Circuits
CO4: Analyze Resonance networks and Locus Diagrams
CO5: Apply network Theorems for the analysis of Network Theorems

UNIT I: CONCEPTS OF ELECTRICAL CIRCUITS

Passive components and their V-I relations. Sources (dependent and independent) –Ohm's law, Kirchhoff's laws, Network reduction techniques, star-to-delta and delta to- star transformation, source transformation technique, nodal analysis and mesh analysis.

UNIT II: MAGNETIC CIRCUIT

Basic definition of MMF, flux and reluctance, flux density, field intensity and its relations. Analogy between electrical and magnetic circuits. Faraday's laws of electromagnetic induction Concept of self and mutual inductance, dot convention, coefficient of coupling. Analysis of series magnetic circuits.

UNIT III: SINGLE PHASE A.C SYSTEMS

Periodic waveforms (determination of rms, average value and form factor). Concept of phase angle and phase difference – Waveforms and phasor diagrams for RLC networks. Complex and polar forms of representations, steady state analysis of series and parallel R, L and C circuits. Power Factor and its significance, real, reactive power and apparent power, power triangle and complex power.

UNIT IV: RESONANCE-LOCUS DIAGRAMS

Series and parallel resonance, selectivity, Band width and Quality factor. Locus diagrams - RL, RC, RLC with R, L & C variables.

UNIT V: NETWORK THEOREMS

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Tellegen's theorem, Milliman's theorem and compensation theorem with DC and AC Excitations.

TEXT BOOKS

1) William Hayt and Jack E. Kemmerley, Engineering Circuit Analysis, McGraw Hill Company, 6th Edition.2017
2) Van Valkenburg, Network Analysis, Prentice-Hall of India Private Limited.3rd edition, 2018

REFERENCE BOOKS

1. Chakrabarthi, Circuit Theory (Analysis and Synthesis), Dhanpat Rai & Co.4th edition,2017
2. Edward Huges. Electrical and Electronic technology, pearson prentice hall, 10th edition, 2015
3. Dr. B. Subramanyam, Electrical Circuits, IK publications
4. Charles K. Alexander and Mathew N.O. Sadiku, Fundamentals of Electrical Circuits, McGraw Hill Education (India),2015
5. De Carlo, Lin, Linear Circuit Analysis, Oxford publications,3 rd edition, 2018
6. Mahmood Nahvi& Joseph Edminister, Adapted by Kuma Rao, Electric Circuits– (Schaum's outlines), 5th Edition – McGraw Hill.2015
7. David A. Bell, Electric Circuits, Oxford publications, 4th edition, 2016
8. Robert L Boylestad, Introductory Circuit Analysis, Pearson Publications.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	-	-	-	-	-	-	-	-	-	1	3			
CO2	2	2	-	-	-	-	-	-	-	-	-	1	3	2	2	
CO3	3	3	2	2	1	-	-	-	1	1	-	-	3	2	2	
CO4	3	3	-	-	-	-	-	-	-	-	-	1	3	1	2	
CO5	3	3	2	2	1	-	-	-	1	1	-	-	3			

Year & Sem	**I Year – I Semester**					
Course Code	**22UCS01**	**L**	**T**	**P**	**SS**	**C**
Course Name	**PROGRAMMING FOR PROBLEM SOLVING USING C**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

The objectives of Programming for Problem Solving Using C are

1. To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
2. To gain knowledge of the operators, selection, control statements and repetition in C
3. To learn about the design concepts of arrays, strings
4. To assimilate about pointers, dynamic memory allocation
5. To assimilate about File, I/O and significance of functions

COURSE OUTCOMES:

Upon the completion of the course the student will learn

CO1: To write algorithms and to draw flowcharts for solving problems and to convert flowcharts/algorithms to C Programs, compile and debug programs

CO2: To use different operators, data types and write programs that use two-way/ multi-way selection

CO3: To select the best loop construct for a given problem

CO4: To design and implement programs to analyze the different pointer applications

CO5: To decompose a problem into functions and to develop modular reusable code and to apply File I/O operations

UNIT-I

Introduction to Computers: Computer Systems – Block Diagram of Computer, Hardware, Software, Algorithms, Flow Charts, Pseudocode.

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples. **Structure of a C Program:** Expressions, types of expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion Statements, Simple Programs.

UNIT-II

Bitwise Operators: Logical Bitwise Operators, Shift Operators, Programming Examples. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multi waySelection, Programming examples. **Repetition:** Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Looping Applications, Programming Examples.

UNIT-III

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Examples. Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions, Programming Examples.

UNIT-IV

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Types of functions, Standard Functions, Passing Array to Functions and Passing Pointers to Functions, Recursion, Scope – Global Scope, Local Scope, Function Scope, and Storage Classes. Pointers: Introduction - Definition, Declaration, Initialization, Accessing, Benefits of Pointers, Why Pointers, Pointers to pointers, Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application.

UNIT-V

Structures and Union: Structure- Definition, Declaration, Accessing, Initialization, Arrays in Structures, Array of Structures, Structure Pointers, structures and functions, Unions and Programming Examples. Files: Files, Streams, Types of Files- Text and Binary Files, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions, Programming Examples

TEXT BOOKS:

1) Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE.
2) The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson.

REFERENCE BOOKS:

1. Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill.
2. Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson.
3. Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	-	2	-	-	-	1	-	-	-	1
CO2	3	1	2	-	-	-	-	-	-	-	-	1	-	-	-	1
CO3	3	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1
CO4	-	2	3	2	3	-	-	-	-	-	-	1	-	-	-	1
CO5	-	1	-	2	3	-	-	-	-	-	-	1	-	-	-	1

Year & Sem	**I Year – I Semester**					
Course Code	**22UME02**	**L**	**T**	**P**	**SS**	**C**
Course Name	**ENGINEERING DRAWING**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

To impart

1. The students to use drawing instruments and to draw polygons, Engineering. Curves.
2. The students to use orthographic projections, projections of points & simple lines. To make the students draw the projections of the lines inclined to both the planes.
3. The students draw the projections of the plane inclined to both the planes.
4. The students draw the projections of the various types of solids indifferent positions inclined to one of the planes.
5. The students to construct object in 3D view through isometric view, to represent and convert the isometric view to orthographic view and vice versa.

COURSE OUTCOMES:

The student will be able to

CO1: Understand the fundamental principles of Engineering Drawing.
CO2: Analyze the applications of scales in Engineering.
CO3: Develop projections of points, lines, planes and solids.
CO4: Understand the applications of orthographic projections
CO5: Understand the applications of isometric projections

UNIT I:

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangents & normal for the curves. Scales: Plain scales, diagonal scales and Vernier scales

UNIT II:

Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to another plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

UNIT III:

Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT IV:

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT V:

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

1) Engineering Drawing by N.D. Bhatt, Chariot Publications
2) Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGraw Hill Publishers

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	2	-	-	-	-	-	-	2	-	1	-	1
CO2	3	2	2	3	2	-	-	-	-	-	-	2	-	1	-	1
CO3	3	2	2	3	2	-	-	-	-	-	-	2	-	1	-	-
CO4	3	2	2	3	2	-	-	-	-	-	-	2	-	1	-	1
CO5	3	2	2	3	2	-	-	-	-	-	-	2	-	1	-	1

Year & Sem	I Year – I Semester					
Course Code	22UEN01	L	T	P	SS	C
Course Name	COMMUNICATIVE ENGLISH	3	1	0	0	3

INTRODUCTION

With the growing importance of English for global communication and the emphasis on training the learners to gain communicative competence, the syllabus is designed to develop linguistic and communicative competence of the engineering students. The major focus of the syllabus is to enhance the communicative ability, with the focus on the language skills, grammar, vocabulary of the learners and to improve the learner's ability to use English language effectively in social, academic and professional contexts. There is a shift from learning about the language to using the language. Thereby enables the learner to appear confidently for international language qualification tests like IELTS, TOEFL, BEC Etc.

COURSE OBJECTIVES:

1. Help students develop effective listening skills so that they can understand academic lectures and native English speakers' speech.
2. Encourage the development of speaking abilities by taking part in exercises like role-playing, dialogues, and organized talks / oral presentations.
3. Pay special attention to effective reading techniques for understanding a range of academic literature and real-world resources.
4. Introduce useful writing techniques and illustrate them by summarizing, composing essays with a clear structure, recording and reporting relevant information.
5. Increase vocabulary and grammatical knowledge, and promote proper use of words both in speech and writing.

COURSE OUTCOMES:

At the end of the module, the learners will be able to

CO1: Comprehend social or transactional discussions presented by native English speakers and recognize the context, subject, and specific information.

CO2: Introduce one self and others and engage in general conversation about well-known subjects.

CO3: Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.

CO4: Recognize paragraph structure and be able to match beginnings/endings/headings with Paragraphs

CO5: Form sentences using proper grammatical structures and correct word forms.

UNIT- 1

Lesson-1: The Scare Crow by Satyajit Ray from Panorama, a course on reading, Oxford publications. Listening: Listening to short audio texts and identifying the topic. Listening to prose and conversations. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work studies and interests. Self-introduction and introducing others. **Reading:** Skimming text to get the main idea. Scanning to look for specific pieces of information. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices, linkers, signposts and transition

signals; mechanics of writing - punctuation, capital letters. **Vocabulary:** Synonyms and Antonyms, Affixes. **Grammar:** Content words and function words, word forms.

UNIT-2

Lesson-1: Nehru's letter to his daughter Indira on her birthday from "**Infotech English**", Maruthi Publications. **Listening:** Answering a series of questions about the main idea and supporting ideas after listening to audio texts, both in speaking and writing. **Speaking:** Discussion in pairs / small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings. **Reading**: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing**: Summarizing - identifying main idea and rephrasing what is read; avoiding redundancies and repetitions. **Vocabulary**: Synonyms and Antonyms, Root words. **Grammar**: Parts of Speech.

UNIT- 3

Lesson-1: Telephone Conversation by Wole Soyinka.

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing. **Reading**: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Critical reading. **Writing**: Letter writing-types, format and principles of letter writing. E-mail etiquette, Writing CV's. **Vocabulary**: Synonyms and Antonyms, Word Formation. **Grammar**: **Verbs, Subject Verb agreement, Common Errors.**

UNIT 4

Lesson-1: Water the Elixir of life by C.V.Raman

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting. **Reading**: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs / tables, writing for media. **Vocabulary:** Synonyms and Antonyms, Phrasal verbs. **Grammar:** Tenses, correction of sentences.

UNIT 5

Lesson-1: Stay Hungry-Stay foolish from "Infotech English", Maruthi Publications

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing, TEDX Videos. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPTslides. Functional English: Suggesting/Opinion giving. **Reading**: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques. **Reading for Writing**: Writing academic proposals- writing research articles: format and style. **Vocabulary**: Synonyms and Antonyms, Idioms and Phrases. **Grammar**: Voices, Degrees of comparison & Reported speech.

TEXT BOOKS:

1) Infotech English", Maruthi Publications.
2) "Panorama, a course on reading", Oxford publications
3) Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
4) Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5) Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
6) Hewings, Martin. Cambridge Academic English (B2). CUP, 2012
7) https://onlinecourses.nptel.ac.in/noc20_hs19/preview
8) https://nptel.ac.in/courses/109106094
9) https://news.stanford.edu (Steve Jobs' Speech)

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	1	1	3	1	1	1	-	-	2
CO2	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	3
CO3	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2
CO4	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	1
CO5	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	2

Year & Sem	**I Year – I Semester**					
Course Code	**22UMT01**	**L**	**T**	**P**	**SS**	**C**
Course Name	**MATHEMATICS-I**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

1. To instruct the concept of Matrices in solving linear algebraic equations.
2. To assist the students to learn the concepts of partial differentiation.
3. To enlighten the learners in the concept of differential equations.
4. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.
5. To make clear the students in the concepts of Multiple Integrals.

COURSE OUTCOMES:

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

CO1: Apply matrix techniques to model and solve system of linear equations.
CO2: To apply the mean value theorems to real life problems.
CO3: Solve the differential equations related to various engineering fields.
CO4: Apply double integration techniques in evaluating areas bounded by region.
CO5: Student will learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensinal and 3-dimensional coordinate systems.

UNIT-I: System of Linear Equations, Eigen Values, Eigen Vectors (12 Hours)

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Elimination method – Eigen values and Eigen vectors and properties. Cayley-Hamilton theorem (without proof) – Reduction of a matrix to Diagonal form. Applications –Finding the inverse and power of a matrix by Cayley Hamilton theorem

Learning Resources: Text Book-1

UNIT-II: Differential Calculus (12 Hours)

Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem Cauchy's mean value theorem–Taylor's and Mac Laurin's theorems with remainders, Problems and applications on the above theorem. Partial Differentiation: Introduction–Homogeneous function–Euler's theorem–Total derivative – Chain rule – Jacobian – Functional dependence –Taylor's and Mac Laurin's series expansion of functions of two variables. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method.

Learning Resources: Text Book-1

UNIT-III: Differential Equations of First Order and First Degree (12 Hours)

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories.

Learning Resources: Text Book-1

UNIT-IV: Differential Equations of Second and Higher Order (14 Hours)

Homogeneous and Non-homogeneous differential equations of higher order with constant coefficients – with non-homogeneous term of the type eax, sin ax, cos ax, polynomials in xn, eaxV(x) and xnV(x) – Method of Variation of parameters, Cauchy and Legendre's linear equations. Applications: LCR circuits.

Learning Resources: Text Book-1

UNIT-V: Multiple Integrals (14 Hours)

Double and Triple integrals – Change of order of integration in double integrals – Change of variables to polar, cylindrical and spherical coordinates. Applications: Finding Areas and Volumes.

Learning Resources: Text Book-1

TEXT BOOKS:

1) **B.S.Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.

REFERENCE BOOKS:

1. Dr.T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganadham, Dr. M.V.S.S.N. Prasad, a text book of Engineering Mathematics, S.Chand Publications.
2. N.P.Bali, Manish Goyal, A text book of Engineering Mathematics, Lakshmi Publications
3. B.V.Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc.Graw Hill Education.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO–PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	-	-	-	-	-	-	-	3	1	1	1	-
CO2	2	2	2	2	-	-	-	-	-	-	-	3	1	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	3	2	1	1	-
CO4	3	3	2	2	-	-	-	-	-	-	-	3	1	1	1	-
CO5	3	3	3	2	-	-	-	-	-	-	-	3	2	1	1	-

Year & Sem	**I Year – I Semester**					
Course Code	**22UEE02**	**L**	**T**	**P**	**SS**	**C**
Course Name	**ELECTRICAL ENGINEERING WORKSHOP LAB**	**0**	**0**	**3**	**0**	**1.5**

COURSE OBJECTIVES:

1. To demonstrate the usage of measuring equipment
2. To train the students in setting up simple wiring circuits
3. To impart methods in electrical machine wiring

COURSE OUTCOMES:

CO1: Explain the limitations, tolerances, safety aspects of electrical systems and wiring.
CO2: Select wires and cables and other accessories used in different types of wiring.
CO3: Explain simple lighting and power circuits
CO4: Design and Analyze Current, voltage and power in a circuit
CO5: Analyze about Batteries and different storage systems

LIST OF EXPERIMENTS:

Any 10 of the following experiments are to be conducted

1) Study of various electrical tools and symbols.
2) Study various types of electrical cables/wires, switches, fuses, fuse carriers, MCB, ELCB, RCCB and MCCB with their specifications and usage.
3) Soldering and de-soldering practice.
4) Identification of various types of resistors and capacitors and understand the usage digital multi-meter.
5) Identification of various semiconductor devices.
6) Study of Moving Iron, Moving Coil, Electro dynamic and Induction type meters.
7) Fluorescent lamp wiring.
8) Wiring of lighting circuit using two-way control (stair case wiring)
9) Go down wiring/ Tunnel wiring Hospital wiring.
10) Measurement of voltage, current, power in DC circuit.
11) Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and energy meter for calculating Power and Power Factor.
12) Measurement of earth resistance.
13) Wiring of backup power supply for domestic Installations including inverter, battery and load.
14) Troubleshooting of domestic electrical equipment's (tube light and fan).
15) Understand the usage of CRO, function generator & Regulated power supply and Measurement of ac signal parameters using CRO.
16) Assembling electronic components on bread board.
17) Obtain V-I characteristics of Light Emitting Diode.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	-	2	-	-	-	2	-	3	-	1	1	2
CO2	1	2	-	-	-	1	-	-	-	-	-	1	-	1	1	3
CO3	2	2	-	-	-	2	-	-	-	-	-	3	-	1	1	2
CO4	2	2	-	-	-	2	-	-	-	-	-	2	-	1	1	2
CO5	3	1	-	-	-	2	-	-	-	-	-	3	-	1	1	2

Year & Sem	I Year – I Semester					
Course Code	22UEN02	L	T	P	SS	C
Course Name	ENGLISH COMMUNICATION SKILLS LAB	0	0	3	0	1.5

COURSE OBJECTIVES

1. Learners learn the basics of phonetics- recognize phonetic symbols and facilitates the learners' use of dictionary for pronunciation.
2. To enhance the articulation of the sounds and pronunciation of words.
3. To improve the communication skills and clarity of speech.
4. To enhance effective communication skills.
5. Enables learners to speak and communicate confidently.

COURSE OUTCOMES:

CO1 : By the end of the semester the learners develop
CO2 : Proper and accurate articulation of the sounds by following standard pronunciation of words and communicate intelligibly. Speaking fluently with neutral accent,
CO3 : Clarity of speech.
CO4 : To communicate in various contexts using choice of appropriate expressions.
CO5 : To acquire several communicative functions. Thereby enable to interact in different social and work situations.

UNIT 1:

Introduction and importance of phonetics. Letters and Sounds, Sounds of English (Consonant Sounds, Vowel Sounds)

UNIT 2:

Pronunciation and pronunciation rules, Plural and past tense marker rules.

UNIT 3:

Syllable, word stress, stress in mono, di, and poly syllabic words, stress in compound words, contrastive, word stress, Rhythm and Intonation.

UNIT 4:

Just A Minute (JAM)

UNIT 5:

Group Discussions and Interview Skills

TEXT BOOKS:

1) Infotech English, Maruthi Publications (with Compact Disc).
2) English Pronunciation in use- Mark Hancock, Cambridge University Press.
3) English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
4) English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.
5) Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju
6) English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
7) Cornerstone, Developing soft skills, Pearson Education Technical Communication- Meenakshi Raman, Sangeeta Sharma, Oxford University Press.
8) https://nptel.ac.in/courses/109106067

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	2
CO2	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	3
CO3	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	2
CO4	-	-	-	-	-	-	-	-	2	3	-	1	1	-	-	1
CO5	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	2

Year & Sem	I Year – I Semester					
Course Code	22UCS02	L	T	P	SS	C
Course Name	PROGRAMMING FOR PROBLEM SOLVING USING C LAB	0	0	3	0	1.5

COURSE OBJECTIVES:

1. Apply the principles of C language in problem solving.
2. To design flowcharts, algorithms and knowing how to debug programs.
3. To design & develop of C programs using arrays, strings pointers & functions.
4. To review the file operations.

COURSE OUTCOMES:

By the end of the Lab, the student

CO1: Gains Knowledge on various concepts of a C language.
CO2: Able to draw flowcharts and write algorithms.
CO3: Able design and development of C problem solving skills.
CO4: Able to design and develop modular programming skills.
CO5: Able to trace and debug a program

Exercise 1:

Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.

Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.

Exercise 2:

Write a C program to calculate the distance between the two points.

Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

Write a C program to calculate the factorial of a given number.

Exercise 4:

Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.

Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1.Write a program to display all prime numbers less than n

2.Write a program to display the following output format

```
1
2       2
3       3       3
4       4       4       4
```

5 5 5 5 5

Exercise 6:

1.Write a program in C to separate odd and even integers in separate arrays.

2.Write a program in C to sort elements of array in ascending order.

Exercise 7:

1.Write a program in C for multiplication of two square Matrices.

2.Write a program in C to find transpose of a given matrix

Exercise 8:

1.Write a program in C to compare two strings without using string library functions.

2.Write a program in C to copy one string to another string.

Exercise 9:

1.Write a c program to read and display the details of an employee using structure

2. Write a c program to demonstrate array of structures

Exercise 10:

Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

Write a C program to find sum of n elements entered by user using pointers

Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

Exercise 11:

1.Write a program in C to swap elements using call by reference

2.Find factorial of given number using recursion

3. Write a program in C to get the largest element of an array using the function

Exercise 12:

1.Write a program in C to append multiple lines at the end of a text file.

2.Write a program in C to copy a file in another name.

3.Write a program in C to remove a file from the disk

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	1	2	-	-	-	-	-	-	1	-	-	-	1
CO2	3	-	-	2	3	-	-	-	-	-	-	1	-	-	-	1
CO3	-	3	-	2	3	-	-	-	-	-	-	1	-	-	-	1
CO4	3	2	-	2	3	-	-	-	-	-	-	1	-	-	-	1
CO5	3	-	2	2	3	-	-	-	-	-	-	1	-	-	-	1

Year & Sem	I Year – I Semester					
Course Code	22UCH03	L	T	P	SS	C
Course Name	ENVIRONMENTAL SCIENCE	2	0	0	0	0

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OBJECTIVES

1. The objectives of the course are to impart:
2. Overall understanding of the natural resources.
3. Basic understanding of the ecosystem and its diversity.
4. Acquaintance on various environmental challenges induced due to unplanned Anthropogenic activities.
5. An understanding of the environmental impact of developmental activities.
6. Awareness on the social issues, environmental legislation and global treaties.

COURSE OUTCOMES

CO1: The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources

CO2: The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web

CO3: The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity

CO4: Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

CO5: About environmental assessment and the stages involved in EIA and the environmental audit.

UNIT-I:

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II:

Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. **Energy resources:** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. **Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III:

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man- wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV:

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his wellbeing.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e– waste management.

UNIT – V:

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting - Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act - Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

1) Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers,Vijayawada
2) Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford UniversityPress.
3) EnvironmentalStudies,P.N.Palanisamy,P.Manikandan, A.Geetha,andK.Manjula Rani; PearsonEducation,Chennai

REFERENCE:

1. Textbook of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, NewDelhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, NewDelhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, NewAge InternationalPublishers,2014

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	3	-	-	2	3	-	-	-	-	-				1
CO2	-	-	3	-	-	2	3	-	-	-	-	-				1
CO3	-	-	3	-	-	2	3	-	-	-	-	-				1
CO4	-	-	3	-	-	2	3	-	-	-	-	-				1
CO5	-	-	3	-	-	2	3	-	-	-	-	-				1

Year & Sem	**I Year – II Semester**					
Course Code	**22UEE03**	**L**	**T**	**P**	**SS**	**C**
Course Name	**Electrical Circuit Analysis-II**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

1. To study the concepts of balanced and unbalanced poly phase circuits.
2. To study the transient behavior of electrical networks with DC, pulse and AC excitations.
3. To study the performance of a network based on input and output excitation/response.
4. To discuss the realization of electrical network function into electrical equivalent passive elements.
5. To discuss the application of Fourier series and Fourier transforms for analysis of electrical circuits.

COURSE OUTCOMES:

CO1: Explain solve three- phase circuits under balanced and unbalanced condition.
CO2: Analyze the transient response of electrical networks for different types of excitations.
CO3: Explain the parameters for different types of networks.
CO4: Realize electrical equivalent network for a given network transfer function.
CO5: Extract different harmonics components from the response of an electrical network.

UNIT-I:

Poly phase circuits: Phase sequence, star and delta connection of sources and loads, relation between line and phase voltages and currents. Analysis of three phase balanced and unbalanced circuits. Loop method, Star-Delta transformation technique, Measurement of power by single wattmeter method, Two wattmeter method for measurement of three phase power.

UNIT-II:

Transient Analysis in DC and AC circuits: Steady state response of R-L, R-C, R-L-C circuits, Transient response of R-L, R-C, R-L-C circuits, Solution using differential equations and Laplace transforms.

UNIT-III:

Two Port Networks: Two port network parameters – Z, Y, Transmission and Inverse Transmission parameters, Hybrid and Inverse hybrid parameters. Interrelationship Between the parameters, Simplification of cascaded and parallel networks.

UNIT-IV:

Fourier Analysis: Fourier theorem – trigonometric form and exponential form of Fourier series, conditions of symmetry – line spectra and phase angle spectra, analysis of electrical circuits to non-sinusoidal periodic waveforms.

UNIT-V:

Fourier Transforms: Fourier integrals and Fourier transforms – properties of Fourier transform physical significance of the Fourier transform and its application to electrical circuits.

TEXT BOOKS

1) Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6 th edition

2) Network synthesis: Van Valkenburg: Prentice-Hall of India Private Ltd.

REFERENCES

1. Fundamentals of Electrical Circuits by Charles Alexander and Mathe Mosaico, Mc Graw Hill Education (India)
2. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
3. Circuits by A.Bruce Carlson , Cengage Learning Publications
4. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications
5. Networks and Systems by D. Roy Choudhury, New Age International publishers
6. Electric Circuits by David A. Bell, Oxford publications
7. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi,Dhanpat Rai&Co.
8. Network analysis & Synthesis by Ravish R Singh Mc Graw Hill Education (India).

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	PSO1	PSO2	PSO3	PSO4
CO1	**3**	3	1	-	-	-	-	-	-	-	-	2	2	2	2	-
CO2	**2**	2	1	-	-	-	-	-	-	-	-	1	3	2	1	-
CO3	**2**	2	2	-	1	-	-	-	-	-	-	1	2	2	2	-
CO4	**3**	3	1	-	2	-	-	-	-	-	-	2	2	2	1	-
CO5	**3**	2	-	1	2	-	-	-	-	-	-	2	3	2	2	-

Year & Sem	I Year – II Semester					
Course Code	22UCS04	L	T	P	SS	C
Course Name	DATA STRUCTURES	3	1	0	0	3

COURSE OBJECTIVES:

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract data types
- Emphasize the importance of data structures in developing and implementing efficient algorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms

COURSE OUTCOMES:

After completing this course, a student will be able to:

CO1: Discuss various sorting & searching Techniques
CO2: Use linked structures in writing programs
CO3: Use Stacks and Queues in Writing Programs
CO4: Use Trees in writing programs and demonstrate different methods for traversing trees
CO5: Demonstrate Graphs and Graph Traversals.

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.
Searching - Linear search, Binary search, Fibonacci search.
Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radixsort), merging (Merge sort) algorithms.

UNIT II

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, linked list Representation of Stacks, Operations on Linked Stack, Applications-Reversing list, Factorial Calculation, Infix to Postfix Conversion, Evaluating Postfix Expressions.
Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues- Circular Queues, Deques, Priority Queues.

UNIT IV

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Tree Traversal – In order, Preorder, Post order. Heaps –Definition, Max Heap, Min Heap, Insertion and Deletion from Max Heap, Heap sort, Binary Search Trees – Basic Concepts, BST Operations: Insertion and Deletion.

UNIT V

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims & Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.

TEXT BOOKS:

1) Data Structures Using C. 2nd Edition. Reema Thareja, Oxford.
2) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

REFERENCE BOOKS:

1) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, UniversitiesPress.
2) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon,Cengage.
3) Data Structures with C, Seymour Lipschutz TMH

E-RESOURCES:

1) http://algs4.cs.princeton.edu/home/
2) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	3	-	-	-	-	-	-	2	-	-	-	1
CO2	3	1	2	2	3	-	-	-	-	-	-	1	-	-	-	1
CO3	3	1	2	2	3	-	-	-	-	-	-	2	-	-	-	1
CO4	3	3	2	2	3	-	-	-	-	-	-	2	-	-	-	1
CO5	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	1

Year & Sem	I Year – II Semester					
Course Code	22UCS03	L	T	P	SS	C
Course Name	IT WORKSHOP	1	0	4	0	3

COURSE OBJECTIVES:

The objective of this lab is to

1. Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
2. Demonstrate basic DOS commands
3. Describe about Antivirus tools
4. Demonstrate Office Tools such as Word processors, Spreadsheets and Presentationtools

COURSE OUTCOMES:

CO1: By the end of this lab the student is able to Assemble and disassemble components of a Personal Computer

CO2: By the end of this lab the student is familiar with DOS commands

CO3: By the end of this lab the student is familiar Viruses

CO4: By the end of this lab the student is able to work on Word, Power Point and MS Excel

LIST OF EXPERIMENTS:

UNIT-1:

Block diagram of a computer, Identification of peripherals of a PC, Laptop, Server, Smart phones, prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/output devices, I/O ports and Interfaces, Main Memory, Cache memory and Secondary Storage Devices, Digital Storage Basics, Networking Components and Speeds.

Experiment -1: Identification of peripherals.

Experiment -2: Assembling, Dissembling of a computer.

UNIT-2:

Software: Definition, Software types, Application Software, System Software**.**

Experiment -1: DOS Commands.

UNIT-3:

MSWord: Creating a Document, Formatting, Bullets and Numbering, Page Settings, Header and Footer, Insert Word Art, Clip Art, Tables.

Experiment -1: Demonstrate and practice on word Formatting **(**Bold, Italic, Underline, Alignments, Fonts, Sizes, Headings etc.,**)**

Experiment -2: Demonstrate and Practice on Page Settings, Margins, Header and Footer**.**

Experiment -3: Demonstrate and Practice on WordArt, ClipArt.

Experiment -4: Demonstrate and Practice on Table Creation.

UNIT-4:

MS Excel: Create work sheet and work book, Search for data with in a Web, Insert Rows, Columns, Hiding of Rows and Columns, Renaming of Worksheet, Adjust Row Height and Column Width, Create Tables.

Experiment -1: Create a Table, Perform sum and average of a sheet.

Experiment -2: Adjust Row height and Column width of a Table as per the Requirements

UNIT-5:

MS Power Point: Create and Manage Presentation, Slide transition and Animation, WWW, Web Browser, Virus, Antivirus, Creating mails.

Experiment -1: Create a PPT on a Topic of your Choice.

Experiment -2: Create a mail id with your Roll Number

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	-	-	-	-	-	-	-	-	**1**	-	-	-	**1**
CO2	3	1	1	-	-	-	-	-	-	-	-	**1**	-	-	-	-
CO3	3	1	1	2	3	-	-	-	-	-	-	**2**	-	-	-	**1**
CO4	3	3	3	2	3	-	-	-	-	-	-	**2**	-	-	-	**1**

Year & Sem	**I Year – II Semester**					
Course Code	**22UMT02**	**L**	**T**	**P**	**SS**	**C**
Course Name	**MATHEMATICS-II**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

1. To illuminate the different numerical methods to solve nonlinear algebraic equations.
2. To give a definition of Interpolation as it relates to mapping / surveying.
3. To familiarize the Laplace, transform techniques in solving the Differential Equations.
4. To familiarize the Fourier Series expansions for periodic functions.
5. To furnish the learners with basic concepts Fourier Transform techniques to lead them into advanced level by handling various real-world applications.

COURSE OUTCOMES:

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

CO1: Evaluate the approximate roots of polynomial and Transcendental equations by different algorithms

CO2: Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals.

CO3: Apply the Laplace transform for solving differential equations.

CO4: Find or compute the Fourier series of periodic signals.

CO5: Apply integral expressions for the forwards and inverse Fourier transform to arrange of non - Periodic wave forms.

UNIT-I: Iterative Methods (12 Hours)

Introduction– Bisection method–Secant method – Method of false position– Iteration method – Newton - Raphson method (One variable only) – Jacobi and Gauss-Seidel methods for solving system of equations numerically.

Learning Resources: Text Book – 1

UNIT-II: Interpolation (12 Hours)

Introduction – Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with un equal intervals –Lagrange's interpolation formula – Newton's divide difference formula.

Learning Resources: Text Book - 1

UNIT-III: Laplace Transforms and Inverse Laplace Transforms (14 Hours)

Laplace transforms –Definition and Laplace transforms of some certain functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function –Dirac's delta function Periodic function – Inverse Laplace transforms – Convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Learning Resources: Text Book – 1

UNIT IV: Fourier Series (12 Hours)

Introduction– Periodic functions – Fourier series of periodic function – Dirichlet's conditions– Even and odd functions–Change of interval– Half - range sine and cosine series.

Learning Resources: Text Book – 1

UNIT V: Fourier Transforms (14 Hours)

Fourier integral theorem (without proof) – Fourier sine and cosine integrals –Sine and cosine transforms – Properties – inverse transforms –Convolution theorem (without proof) – Finite Fourier transforms.

Learning Resources: Text Book - 1

TEXT BOOKS:

1) B.S.Grewal,Higher Engineering Mathematics, 44thEdition, Khanna Publishers.

REFERENCE BOOKS:

1. Dr.T.K.V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganadham, Dr. M.V.S.S.N. Prasad, A text book of Engineering Mathematics, S. Chand Publications.
2. **B.V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3. **N.P. Bali, Manish Goyal**, A text book of Engineering Mathematics, Lakshmi Publications
4. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10thEdition, Wiley-India.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	-	-	-	-	-	-	-	3	2	1	1	-
CO2	3	2	3	2	-	-	-	-	-	-	-	3	3	1	1	-
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	1	1	-
CO4	2	3	3	2	-	-	-	-	-	-	-	2	2	1	1	-
CO5	3	3	2	2	-	-	-	-	-	-	-	3	3	1	1	-

Year & Sem	**I Year – II Semester**					
Course Code	**22UPH01**	**L**	**T**	**P**	**SS**	**C**
Course Name	**APPLIED PHYSICS**	**3**	**1**	**0**	**0**	**3**

COURSE DESCRIPTION AND OBJECTIVES:

This course provides seamless consolidation of basic principles of Physics and applications. It emphasizes on modern technological advancement relevant to the latest developments in the fields of science, engineering, and technology and to have an insight into Dielectric and magnetic materials, principles of quantum mechanics, and electron dynamics of solids from the perspective of optoelectronic devices.

1. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
2. Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
3. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of de Broglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals and band theory for crystalline solids. Metals-Semiconductors-Insulators concepts utilization of transport phenomenon of charge carriers in semiconductors.
4. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5. To Understand the physics of optoelectronic devices and working mechanism of display devices.

COURSE OUTCOMES:

CO1 : Select the concepts of Physical Optics in view of engineering applications. Apply the knowledge of dielectric and magnetic materials to analyze them.
CO2 : Grade the wavelengths of Lasers for suitable applications in the field of industry, medicine and communication and foster the knowledge on optical fibers.
CO3 : Appraise electron dynamics based on quantum principles.
CO4 : Choose dielectric and magnetic material to demonstrate the functioning of electric and electronic devices.
CO5 : Judge the performance of optoelectronic devices based on their construction.

UNIT-I: Wave Optics **12hrs**

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction-Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

Unit Outcomes:

- The students will be able to Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary polarized light and extraordinary polarized light (L2)

UNIT-II: Lasers and Fiber optics **8hrs**

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping mechanisms – Ruby laser – He-Ne laser - Applications of lasers.

Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture - Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers - Applications.

Unit Outcomes:

- The students will be able to Understand the basic concepts of LASER light Sources (L2)
- Apply the concepts to learn the types of lasers (L3)
- Identifies the Engineering applications of lasers (L2)
- Explain the working principle of optical fibers (L2)
- Classify optical fibers based on refractive index profile and mode of propagation (L2)
- Identify the applications of optical fibers in various fields (L2)

UNIT III: Quantum Mechanics, Free Electron Theory and Band theory **10hrs**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory-Fermi-Dirac distribution- Density of states (3D) - Fermi energy. **Band theory of Solids:** Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - v vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

Unit Outcomes:

- The students will be able to explain the concept of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Explain the importance of K-P model¬ Classify the materials based on band theory (L2)
- Apply the concept of effective mass of electron (L3)

UNIT-IV: Dielectric and Magnetic Materials 8hrs

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation. **Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain

walls (Qualitative) - Hysteresis - soft and hard magnetic materials- Eddy currents- Ferrites- Engineering applications.

Unit Outcomes:

- The students will be able to Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Claussius- Mosotti relation in dielectrics(L2)¬
- Classify the magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)
- Apply the concept of magnetism to magnetic data storage devices (L3)

UNIT V: Semiconductors, Opto Electronic Devices and Nano Materials 10 hrs

Semiconductors: Bands in solids- Valence and conduction band, effective mass (Qualitative), Intrinsic and extrinsic semiconductors-P type and N type, Donor and acceptor levels (Qualitative), Determination of energy gap in semiconductors. Drift and Diffusion currents, Einstein relations, Direct and indirect semiconductors, **Opto electronic Devices:** Photo voltaic effect, Solar cell, Photo detectors, Photodiodes-PIN and APD, Principle and working of LED, Liquid crystal display (LCD), Applications of opto electronic devices.

TEXT BOOKS:

1) **M.N.Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"- S.Chand Publications, 11th Edition 2019.**
2) Engineering Physics" by D.K.Bhattacharya and PoonamTandon, Oxford press (2015).
3) Applied Physics by P.K.Palanisamy SciTech publications.

REFERENCE BOOKS:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers (2009).
3. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Education, 2018
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-	1
CO2	3	3	3	-	-	-	-	-	-	3	-	2	-	-	-	--
CO3	3	-	3	3	3	-	-	-	-	-	-	2	1	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO5	3	3	3	3	-	-	-	-	-	3	-	2	-1	-	-	-

Year & Sem	**I Year – II Semester**					
Course Code	**22UCS06**	**L**	**T**	**P**	**SS**	**C**
Course Name	**DATA STRUCTURES USING C LAB**	**0**	**0**	**3**	**0**	**1.5**

COURSE OBJECTIVES:

The objective of this lab is to

- Demonstrate the different data structures implementation.

COURSE OUTCOMES:

By the end of this lab the student is able to

CO1: Use various searching and sorting algorithms

CO2: Use basic data structures such as arrays and linked list.

CO3: Programs to demonstrate fundamental algorithmic problems including Stacks, Queues and Tree Traversals.

List of Experiments:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linearsearch for a key value in a given list.
b) Write C program that use both recursive and non-recursive functions to perform Binary search for a key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascendingorder
b) Write C program that implement Quick sort, to sort a given list of integers in ascendingorder
c) Write C program that implement Insertion sort, to sort a given list of integers in ascendingorder

Exercise -3(Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order
b) Write C program that implement merge sort, to sort a given list of integers in ascendingorder

Exercise -4(Singly Linked List)

a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list
d) Write a C program to reverse elements of a single linked list.

Exercise -5(Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list
c) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -6(Queue)

a) Write C program that implement Queue (its operations) using arrays.
b) Write C program that implement Queue (its operations) using linked lists

Exercise -7(Binary Tree)

a) Write a recursive C program for traversing a binary tree in preorder, in order and post order.

Exercise -8(Binary Search Tree)

a) Write a C program to Create a BST
b) Write a C program to insert a node into a BST.
c) Write a C program to delete a node from a BST.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	3	-	-	-	3	-	-	2	-	-	-	2
CO2	3	1	2	2	3	-	-	-	3	-	-	2	-	-	-	2
CO3	3	1	2	2	3	-	-	-	3	-	-	2	-	-	-	1

Year & Sem	**I Year – II Semester**					
Course Code	**22UEE04**	**L**	**T**	**P**	**SS**	**C**
Course Name	**ELECTRICAL CIRCUITS LAB**	**0**	**0**	**3**	**0**	**1.5**

COURSE OBJECTIVES:

1. To verify and demonstrate various theorems
2. To explain locus diagrams and resonance
3. To demonstrate about two port networks
4. To determine self and mutual inductance of a magnetic circuit
5. To know the parameters of a given coil and measurement of 3- phase power.

COURSE OUTCOMES:

Students must be able to

CO1: Analyze different theorems
CO2: Explain locus diagram and resonance
CO3: Understand about two port networks
CO4: Explain self and mutual inductance of a magnetic circuit
CO5: Analyze the parameters of a given coil and measurement of 3- phase power.

Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin's and Norton's Theorems.
2) Verification of superposition theorem and maximum power transfer theorem
3) Verification of compensation theorem
4) Verification of reciprocity, Millman's Theorems
5) Determination of time constants of R-L, R-C networks using CRO.
6) Series and parallel resonance
7) Determination of self, mutual inductances and coefficient of coupling
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Parameters of a choke coil.
11) Determination of cold and hot resistance of an electric lamp.
12) Measurement of 3-phase power by two Wattmeter method for unbalanced loads

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	-	-	-	2	-	-	3	-	-	3	2	2	2	-
CO2	2	2	-	-	-	1	-	-	3	-	-	3	2	2	2	-
CO3	2	2	-	-	-	2	-	-	3	-	-	3	2	2	2	-
CO4	2	2	-	-	-	1	-	-	3	-	-	3	2	2	2	-
CO5	3	2	-	-	-	2	-	-	3	-	-	3	2	2	2	-

Year & Sem	I Year – II Semester					
Course Code	22UPH02	L	T	P	SS	C
Course Name	APPLIED PHYSICS LABORATORY	0	0	3	0	1.5

COURSE OBJECTIVES

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

COURSE OUTCOMES (COS)

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

CO1 : Apply the various procedures and techniques for the experiments.

CO 2 : Use the different measuring devices and meters to record the data with precision.

CO 3 : Apply the mathematical concepts/equations to obtain quantitative results.

CO 4 : Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

(Any 10 of the following listed experiments)

List of Applied Physics Experiments

1. Determination of thickness of thin object by wedge method.
2. Determination of radius of curvature of a given plano convex lens by Newton's rings.
3. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
4. Determination of dispersive power of the prism.
5. Determination of dielectric constant using charging and discharging method.
6. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
7. Determination of numerical aperture and acceptance angle of an optical fiber.
8. Determination of wavelength of Laser light using diffraction grating.
9. Estimation of Planck's constant using photoelectric effect.
10. Determination of the resistivity of semiconductor by four probe method.
11. To determine the energy gap of a semiconductor using p-n junction diode.
12. Magnetic field along the axis of a current carrying circular coil by Stewart &Gee's Method
13. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
14. Measurement of resistance of a semiconductor with varying temperature.
15. Resistivity of a Superconductor using four probe method & Meissner effect.

REFERENCES:

1. S. Balasubramanian, M.N. Srinivasan "A Text Book of Practical Physics"- S Chand Publishers, 2017

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	-	3	-	-	-	3	-	-	2	1	1	1	-
CO2	3	2	3	-	3	-	-	-	3	-	-	2	1	-	1	-
CO3	2	2	3	-	3	-	-	-	3	-	-	2	1	1	1	-
CO4	3	2	3	-	3	-	-	-	3	-	-	2	1	-	-	-

Year & Sem	I Year – II Semester					
Course Code	22UEN03	L	T	P	SS	C
Course Name	CONSTITUTION OF INDIA	2	0	0	0	0

COURSE OBJECTIVES:

1. To Enable the student to understand the importance of Constitution
2. To understand the structure of Executive, Legislature and Judiciary
3. To understand philosophy of Fundamental Rights and Duties
4. To understand the autonomous nature of constitutional bodies like Supreme Court and High Court Controller and Auditor General of India and Election Commission of India.
5. To understand the Central and State relation Financial and Administrative.

COURSE OUTCOMES:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

CO1 : Understand Historical Background of the Constitution Making and its importance for building a Democratic India.

CO2 : Understand the functioning of three wings of the Government i.e., Executive, Legislative and Judiciary.

CO3 : Understand the value of the Fundamental Rights and Duties for becoming good citizen of India.

CO4 : Analyze the decentralization of power between Central, State and local Self-Government.

CO5 : Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining Democracy.

UNIT-I:

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and Constitutional History, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Unit outcomes: After completion of this unit student will

- Understand the concept of Indian Constitution
- Apply the knowledge on Directive Principle of State Policy
- Analyze the History, Features of Indian Constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II:

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, Power and Position, PM and Council of Ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

Unit outcomes: -After completion of this unit student will

- Understand the structure of Indian Government
- Differentiate between the State and Central Government
- Explain the role of President and Prime Minister
- Know the Structure of Supreme Court and High court

UNIT-III:
State Government and its Administration Governor - Role and Position - CM and Council of Ministers, State Secretariat: Organization, Structure and Functions

Unit outcomes: -After completion of this unit student will

- Understand the structure of State Government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between Structure and Functions of State Secretariat

UNIT-IV:
A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zilla Panchayat, Elected Officials and their roles, CEO Zilla Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root Democracy

Unit outcomes: -After completion of this unit student will

- Understand the Local Administration
- Compare and contrast District Administration role and importance
- Ana the role of Mayor and elected representatives of Municipalities
- Evaluate Zilla panchayat block level organization

UNIT-V:
Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

Unit outcomes: -After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election Commissioner and Commissionerate
- Analyze role of State Election Commission
- Evaluate various commissions of viz SC/ST/OBC and women

REFERENCES:
1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. NewDelhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice –Hall of India Pvt. Ltd. New Delhi

9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	2	-	1	-	-	-	**2**	-	-	-	3
CO2	-	-	-	-	-	1	-	1	-	-	-	**2**	-	-	-	3
CO3	-	-	-	-	-	-	-	2	-	-	-	**2**	-	-	-	3
CO4	-	-	-	-	-	-	-	1	-	-	-	**2**	-	-	-	3
CO5	-	-	-	-	-	1	-	1	-	-	-	**2**	-	-	-	3

Year & Sem	II Year – I Semester					
Course Code	22UEE08	L	T	P	SS	C
Course Name	ELECTROMAGNETIC FIELDS	3	1	0	0	3

COURSE OBJECTIVES:

To study the production of electric field and potentials due to different configurations of static charges.

1. To study the properties of conductors and dielectrics, calculate the capacitance of different configurations. Understand the concept of conduction and convection current densities.
2. To study the magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations.
3. To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
4. To develop the concept of self and mutual inductances and the energy stored.
5. To study time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced EMF

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to

CO1 : Define, understand and explain concepts on electrostatics, magnetostatics and time varying fields.

CO2 : Apply basic laws and theorems to determine the electrostatic and magneto static fields.

CO3 : Analyze different parameters of static electric and magnetic fields.

CO4 : Analyze time varying fields and compute the energy stored in electromagnetic fields

CO5 : Calculate capacitance and inductance of common conductor configurations and energy stored

UNIT – I:

Static Electric Field – I: Introduction to co-ordinate systems, Coulomb 's law, Electric field intensity, Electrical field due to point charges, Infinite Line Charge, Surface charge. Gauss law and its applications- Point Charge, Infinite Line Charge, Co-axial cable. Concept of Divergence and Divergence theorem. Energy expended in moving a point charge in an electric field, Absolute Electric potential, Potential difference, Calculation of potential difference for point charges, Potential Gradient. Poisson 's and Laplace 's equations, Solution of Laplace equations in one variable.

UNIT – II:

Static Electric Field – II: Electric dipole, Dipole moment, potential and electric filed due to an electric dipole, Torque on an Electric dipole in an electric field. Current and current density, Ohms Law in Point form, Continuity of current equation, conductor properties and boundary conditions. Nature of dielectric materials, Boundary conditions for perfect dielectric materials. Capacitance, Capacitance of parallel plate, Spherical, Co-axial capacitors and Parallel plate capacitor with Composite Dielectric. Electrostatic Energy and Energy density.

UNIT -III

Static Magnetic Fields: Magnetic flux, flux density and field intensity. Biot - Savart Law and its applications- magnetic field intensity due to straight current carrying filament, circular and solenoid current carrying loops.

Ampere's circuital Law and its Applications- infinite sheet of current and a long current carrying filament. CURL, Point form of Ampere's circuital law.

UNIT -IV

Magnetic Forces and Inductance Force on a moving charge, Lorentz force equation, Force on a differential current element, Force between two differential current elements, Torque on a current loop placed in a magnetic field. Magnetic boundary conditions, Magnetic dipole and dipole moment, torque on magnetic dipole. Inductances and mutual inductances, determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane, energy stored and energy density in a magnetic field.

UNIT - V

Time Varying Fields: Faraday's law for Electromagnetic induction, conduction and Displacement current, Point form and Integral form of Maxwell's equations, Poynting vector and Poynting theorem.

TEXT BOOKS

1) Mathew N. O. Sadiku "Elements of Electromagnetics," Oxford University Press, 2018
2) William H. Hayt, Jr.John A. Buck, M Jaleel Akhtar "Engineering Electromagnetics", McGraw-Hill, 9thEdition, 2020

REFERENCE BOOKS

1. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, 2nd edition, New Delhi, 2008.
2. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
3. John D Kraus, "Electromagnetics", McGraw Hill, 2003.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	-	-	1	-	-	1	3	2	2	-
CO2	3	2	-	-	-	-	-	-	1	-	-	1	3	2	2	-
CO3	3	3	-	-	-	-	-	-	1	-	-	1	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	-	-	1	3	3	3	-
CO5	3	2	-	-	-	-	-	-	1	-	-	1	3	2	2	-

Year & Sem	II Year – I Semester					
Course Code	22UEE09	L	T	P	SS	C
Course Name	POWER SYSTEMS-I	3	1	0	0	3

COURSE OBJECTIVES:

1. To study the solar radiation data, equivalent circuit of PV cell and its I-V & P-V characteristics.
2. To understand the concept of Wind Energy Conversion & its applications.
3. To study the principles of generation of thermal hydel and nuclear energy.
4. Understand the economics of power generation, different tarrifs and power factor improvement techniques

COURSE OUTCOMES:

After the completion of the course the student should be able to:

CO1 : Demonstrate the principle of Energy production from Thermal and hydel energy sources.
CO2 : Illustrate the components and its working in nuclear energy systems.
CO3 : Analyze solar and wind generating systems and estimate the power generation .
CO4 : Evaluate the economic aspects and different metrics on in power generation.
CO5 : Distinguish various types of tarrifs and suggesting suitable type of power factor correction method for real time scenario.

UNIT - I

Hydroelectric power stations: Introduction –General layout of Hydroelectric plant, selection of site, classification - run off river plants with pondage and without pondage - storage reservoir plants - pumped storage plants. Merits and demerits of hydroelectric power plant.

Thermal Power Stations: General layout of Modern thermal plant, selection of site, coal handling, pulverization of coal, ash handling systems, ESP system, Brief description of Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers. Comparison of thermal and hydel power plants.

UNIT - II

Nuclear Power Stations: Nuclear fuels- Fissile and fertile materials, Nuclear Fission, Chain reaction, Principle of operation of Nuclear reactor – General layout of Nuclear power plant, Reactor Components, Brief description of PWR, BWR and FBR, Radiation hazards, Nuclear waste disposal.

UNIT - III

Solar Photovoltaic Systems: Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems.

Wind Energy systems: Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine.

UNIT - IV

Economic Aspects of Power Generation: Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants.

UNIT - V

Tariff: Tariff Methods- Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods.

Power factor improvement: power factor definition, disadvantages and causes of low power factor, methods of power factor improvement-static capacitor, synchronous condenser. Advantages of power factor improvement.

TEXT BOOKS:

1) A course in Electrical Power systems, J.B. Gupta, Kataria Publications
2) A Text Book on Power System Engineering, M.L. Soni, P.V. Gupta, U.S. Bhatnagar and Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.
3) A Text Book on Power System engineering, R.K.Rajput, Laxmi Publication (P) Ltd.
4) Non-Convention Energy Resources B H Khan McGraw Hill Education (India) Pvt. Ltd. 3rd Edition

REFERENCE BOOKS:

1. G.D.Rai, Non-Conventional Energy Sources, Khanna Publications, 2011
2. John Twidell & Tony Weir, Renewable Energy Sources, Taylor & Francis, 2013.
3. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	2	-	-	2	-	-	-	-	-	2	-	3	3	-
CO2	1	-	2	-	-	3	-	-	-	-	-	2	-	3	3	-
CO3	2	-	3	-	-	1	3	-	-	-	2	2	-	3	3	-
CO4	2	-	2	-	-	2	-	-	-	-	2	2	3	3	3	-
CO5	2	-	2	-	-	2	-	-	-	-	2	2	3	3	3	-

Year & Sem	II Year – I Semester					
Course Code	22UEE10	L	T	P	SS	C
Course Name	DC MACHINES AND TRANSFORMERS	3	1	0	0	3

COURSE OBJECTIVES:

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world- view and basic principles of Yoga and holistic health care system

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 : Classify the performance characteristics of D.C generators

CO2 : Analyze the different configurations of D.C motors and its starting techniques

CO3 : Analyze the speed control methods and testing techniques of D.C machines and understand performance of transformer under various loading conditions

CO4 : Analyze various losses and methods of testing single phase transformer

CO5 : understanding various configurations and harmonic on three phase transformers.

UNIT–I

DC Generators

Principle of operation and construction of DC machine – EMF equation of DC generator – Classification of DC generators–operating characteristics of DC Generators– applications of DC Generators.

UNIT–II

DC Motors

Principle of operation of DC Motor-Classification of DC Motors-Torque and back- emf equations of dc motors – Armature reaction and commutation –Operating characteristics of DC Motors- losses and efficiency– applications of dc motors. Importance of a starter – 3 point starter- 4 point starters

UNIT-III

Speed Control Methods and Testing of DC Machines

Methods of speed control of DC Motors-Testing of DC machines: Direct Method, Indirect method – Hopkinson's method – Fields test for series machines-Retardation test – Separation of losses.

Single-phase Transformers: Types and constructional details – principle of operation –emf equation – operation on no load and on load – lagging, leading and unity power factors loads –phasor diagrams of transformers – equivalent circuit.

UNIT-IV

Performance and testing of transformers and auto transformers: Regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – all day efficiency. Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses – parallel operation with equal voltage ratios – auto transformer – equivalent circuit – comparison with two winding transformers.

UNIT - V

3-Phase Transformer: Polyphase connections- Y/Y, Y/ Δ, Δ/Y, Δ/ Δ and open Δ- third harmonics in phase voltages – three winding transformers- transients in switching –off load and on load tap changers, Scott connection.

TEXT BOOKS:

1. Electrical Machines by P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charles kingsley,Stephen D.Umans, TMH

REFERENCE BOOKS:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth,Mc Graw Hill Publications, 4 edition
2. Electrical Machines by R.K.Rajput, Lakshmi publications, 5th edition.
3. Electrical Machinery by Abijith Chakrabarthi and Sudhipta Debnath, Mc Graw Hill education 2015
4. Electrical Machinery Fundamentals by Stephen J Chapman Mc Graw Hill
5. education 2010
6. Electric Machines by Mulukutla S.Sarma&Mukesh k.Pathak, CENGAGE Learning.
7. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria & Sons

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	-	2	-	1	-	-	1	2	2	2	2	-
CO2	2	2	-	-	-	2	-	1	-	-	1	2	2	2	2	-
CO3	2	2	-	-	-	2	-	1	-	-	1	2	2	2	2	-
CO4	2	2	-	-	-	2	-	1	-	-	1	2	2	2	2	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-	2	2	2	-

Programme	**Common to all B.Tech. ECE**					
Year & Sem	**II Year – I Semester**					
Course Code	**22UEC03**	**L**	**T**	**P**	**SS**	**C**
Course Name	**ELECTRONIC DEVICES AND CIRCUITS**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

The main objectives of this course are

- To learn and understand the basic concepts of semi-conductor physics.
- Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
- To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
- Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics. To learn and understand the purpose of transistor biasing and its significance.
- Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

COURSE OUTCOMES:

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

CO1: Apply the basic concepts of semiconductor physics.
CO2: Understand the formation of p- n junction and how it can be used as a p-n junction as diode in different modes of operation.
CO3: Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
CO4: Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics indifferent configurations.
CO5: Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.

UNIT-I: Review of Semiconductor Physics: law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors, Hall effect.

Junction Diode Characteristics: energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.

UNIT-II:

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Varactor Diode, Photodiode, Tunnel Diode, UJT

Rectifiers and Filters: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter (Series inductor), Capacitor filter(Stunt inductor), π- Filter, comparison of various filter circuits in terms of ripple factors.

UNIT-III: **Transistor Characteristics:**

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics μ, g_m, r_d parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET**.**

UNIT- IV: **Transistor Biasing and Thermal Stabilization:** Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias, Stabilization against variations in V_{BE}, Ic, and β ,Stability factors,(S,S',S''), Bias compensation, Thermal runaway, Thermal stability.

FET Biasing- methods and stabilization.

UNIT-V: Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.
FET: Generalized analysis of small signal model FET, Analysis CS amplifier.

TEXT BOOKS:

1. Electronic Devices and Circuits-J.Millman, C.Halkias, Tata Mc-Graw Hill, Second Edition, 2007
2. Electronics devices & circuit theory-Robert L.Boylestad and Loui Nashelsky, Pearson / Prenticehall, tenth edition, 2009
3. Electronic Devices and Circuits-K. Lal Kishore, BS Publications, Fourth Edition, 2016.

REFERENCES:

1. Microelecrtronic circuits Theory and applications.-Adel S.sedra,Kenneth C.Smith,OXFORD international student Edition, Sixth Edition,2013
2. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications
3. ElectronicDevicesandCircuits-Salivahanan,Kumar,Vallavaraj,TataMc-GrawHill,4th Edition, 2008.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	-	-	-	-	-	-	-	3	3	-	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	3	3	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	2	2	-	-	-
CO4	2	3	3	2	-	-	-	-	-	-	-	2	2	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	3	3	-	-	-

Programme	**EEE**					
Year & Sem	**II Year – I Semester**					
Course Code	**22UCS26**	**L**	**T**	**P**	**SS**	**C**
Course Name	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES

- Understanding the OOPS concepts, classes and objects, inheritance and working on them.
- Developing multithreaded programs
- Getting knowledge to handle exceptions, creating packages and using them
- Learning to implement Event driven programming using AWT and applets.

COURSE OUTCOMES

- After the completion of the course the student should be able to:
- Understand Object Oriented driven Java programming using constructors, finalizers, inheritance, overloading, overriding, creating packages, exception handling, multithreading etc.
- Write, compile, execute and troubleshoot Event driven Java programming and utilize Java Graphical User Interface in Program writing.

UNIT I

OOP: Introduction to OOP, procedural programming language and object-oriented language, principles of OOP, OOP concepts, applications of OOP.

UNIT II

JAVA FUNDAMENTALS: History of java, java features, JVM, Program structure, Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, control structures, Arrays.

UNIT III

OBJECTS AND CLASSES: Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, finalizer, garbage collector, static keyword, this keyword, command line arguments, nested classes.

UNIT IV

INHERITANCE: Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces,

PACKAGES: Creating the packages, using packages, importance of CLASSPATH and java.lang package.

UNIT V

EXCEPTION HANDLING: Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions.

MULTITHREADING: Introduction, Thread life cycle, Creation of threads, Thread priorities, Multithreading

APPLETS: Applet class, Applet structure, Applet life cycle, sample Applet programs.

TEXT BOOKS

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.

REFERENCE BOOKS

1. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.
2. Programming with Java, 6th Edition, E Balagurusamy, Mc Graw Hill.

Contribution of Course Outcomes (COs) towards the achievement of Programme outcomes (POs)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	-	-	2	-	-	-	-	-	2	2	-	-	-	1
CO2	3	3	3	-	-	-	-	-	2	-	2	2	-	-	-	1
CO3	3	3	3	2	2	-	-	-	-	-	-	2	-	-	-	1

Year & Sem	II Year – I Semester					
Course Code	22UEC04	L	T	P	SS	C
Course Name	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	0	0	3	0	1.5

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers,Coils, Gang Condensers, Relays, Breadboards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs,UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter ,Function Generator, Regulated Power Supply and CRO.

List of Experiments (Any 10 of the following listed experiments)

1. P-N Junction Diode Characteristics.
2. Zener Diode Characteristics.
3. Zener Diode as Voltage Regulator (Design).
4. CRO Operation and its Measurements.
5. Half Rectifier (without and with c-filter)
6. Full Rectifier (without and with c-filter)
7. BJT characteristics (CB-input, output characteristics and measurement of device parameters).
8. BJT Characteristics (CE-input, output characteristics and measurement of device parameters)
9. FET Characteristics (CS Configuration)
10. UJT Characteristics
11. Transistor Self Biasing
12. BJT-CE Amplifier
13. Emitter Follower-CC Amplifier
14. FET-CS Amplifier

Course learning **objectives**

1. To study basic electronic components.
2. To observe characteristics of electronic devices

Course Outcomes (COs)

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

1.Measure voltage, frequency and phase of any waveform using CRO.
2. Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
3. Analyze the characteristics of different electronic devices such as diodes, transistors etc.
4. Analyze and design simple circuits like rectifiers, power supplies and amplifiers etc.,

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	3	-	-	-	3	2	-	-	1	1	1	-
CO2	3	-	-	-	3	-	-	-	3	-	-	-	1	1	1	-
CO3	2	-	-	-	3	-	-	-	3	1	-	-	1	1	1	-
CO4	3	-	-	-	3	-	-	-	3	-	-	-	1	1	1	-

Year & Sem	**II Year – I Semester**					
Course Code	**22UCS27**	**L**	**T**	**P**	**SS**	**C**
Course Name	**OBJECT ORIENTED PROGRAMMING WITH JAVA LAB**	**0**	**0**	**3**	**0**	**1.5**

COURSE OBJECTIVES:

The aim of this lab is to

- Practice programming in the Java
- Gain knowledge of object-oriented paradigm in the Java programming language
- Learn use of Java in a variety of technologies and on different platforms

COURSE OUTCOMES:

By the end of the course student will be able to write java program for

- Evaluate Operations, Expressions, Control-flow, Strings
- Determine Class, Objects, Methods, Inheritance, Built-in Exceptions, User define Exception handling mechanism
- Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
- Construct Threads, implement packages, developing producer consumer problem

Exercise - 1 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to find any given string is palindrome or not without using built-in functions.

Exercise - 2 (Class, Objects)

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program to implement constructor.

Exercise - 3 (Methods)

a) Write a JAVA program to implement constructor overloading.

b) Write a JAVA program implement method overloading.

Exercise - 4 (Inheritance)

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement Multi level Inheritance

Exercise - 5 (Inheritance - Continued)

a) Write a JAVA program give example for "super" keyword.

b) Write a JAVA program illustrating multiple inheritance using interfaces.

Exercise - 6 (Exception Handling)

a) Write a JAVA program for creation of User Defined Exception

b) Write a JAVA program Illustrating Multiple catch clauses

Exercise - 7 (Threads)

a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds

b) Write a JAVA program to implement thread priorities.

Exercise - 8 (Applets)

a) Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program that display the x and y position of the cursor movement using Mouse.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO.1	2	2	2	1	1	-	-	1	-	1	-	1				1
CO.2	2	3	2	1	1	-	-	-	1	1	1	1				1
CO.3	2	2	2	2	1	-	-	-	1	1	1	1				1
CO.4	2	3	3	2	2	1	-	1	1	1	1	1				1

Sem	**II Year – I Semester**					
Course Code	**22UEE11**	**L**	**T**	**P**	**SS**	**C**
Course Name	**DC MACHINES AND TRANSFORMERS LAB**	**0**	**0**	**3**	**0**	**1.5**

Preamble: The aim of the lab is to demonstrate the operation of various types of DC machines and transformers under no load and loaded conditions by conducting various tests and performance will be analyzed.

COURSE OBJECTIVES

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

COURSE OUTCOMES (COS)

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

CO 1 : Analyze the magnetization characteristics and performance of D.C generators.
CO 2 : Classify the characteristics of DC motor and determine efficiency of D.C machine.
CO 3 : Classify the characteristics and testing methods of single-phase transformers
CO 4 : Analyze the performance of transformers .

Any 5 experiments from each part

Part – A

1. Determination of critical field resistance and critical speed of DC shunt generator by using Magnetization characteristics
2. Predetermination of efficiency of DC Machine by conducting Swinburne's test
3. Performance characteristics of a DC shunt motor by conducting Brake test.
4. Predetermination of efficiency of two DC shunt machines by conducting Hopkinson's test
5. Speed control of DC shunt motor by Field and armature Control methods
6. Determination of constant losses of DC shunt motor by conducting Retardation test

Part –B

1. Predetermination of efficiency, regulation and to obtain the parameters of the equivalent circuit of a single-phase transformer by conducting OC & SC tests.
2. Predetermination of efficiency, regulation and to obtain the parameters of the equivalent circuit of a single-phase transformer by conducting Sumpner's test.
3. Parallel operation of two Single phase Transformers under no-load and load conditions
4. Separation of core losses of a single-phase transformer
5. Heat run test on a bank of three single phase Delta connected transformers
6. Conversion of three phase to two phase supply by using Scott connection of transformers

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	-	2	-	1	3	-	1	2	1	1	-	-
CO2	2	2	-	-	-	2	-	1	3	-	1	2	2	2	-	-
CO3	2	2	-	-	-	2	-	1	3	-	1	2	1	1	-	-
CO4	2	2	-	-	-	2	-	1	3	-	1	2	1	1	-	-
CO5	2	2	-	-	-	2	-	1	3	-	1	2	1	1	-	-

Year & Sem	II Year – I Semester					
Course Code	22UEE12	L	T	P	SS	C
Course Name	Skill Course in MAT LAB SIMULINK	0	0	3	0	1

Preamble:

The aim of the course is to simulate various theorems and resonance. Also to determine self and mutual inductance of a magnetic circuit, parameters of a given coil through simulation.

Course Objectives:

1. To Learn the fundamentals of MATLAB Tools
2. To generate various waveform signals and sequences
3. To verify and simulate various electrical circuits using Mesh and Nodal Analysis
4. To verify and simulate various theorems
5. To verify and simulate RLC series and parallel resonance.
6. To determine self and mutual inductance of a magnetic circuit, parameters of a given coil.

List of Experiments

(Any 10 of the following experiments are to be conducted)

Note: MATLAB/SMULINK fundamentals shall be explained during the first week before starting of the Lab course

1. Generation of various signals and sequences (Periodic and Aperiodic), such as unit Impulse, Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp.
2. Operations on signals and sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy, and Average Power
3. Verification of Kirchhoff's current law and voltage law using simulation tools.
4. Verification of mesh analysis using simulation tools.
5. Verification of nodal analysis using simulation tools.
6. Determination of average value, rms value, form factor, peak factor of sinusoidal wave, square wave using simulation tools.
7. Verification of super position theorem using simulation tools.
8. Verification of reciprocity theorem using simulation tools.
9. Verification of maximum power transfer theorem using simulation tools.
10. Verification of Thevenin's theorem using simulation tools.
11. Verification of Norton's theorem using simulation tools.
12. Verification of compensation theorem using simulation tools.
13. Verification of Milliman's theorem using simulation tools.
14. Verification of series resonance using simulation tools.
15. Verification of parallel resonance using simulation tools.
16. Verification of self-inductance and mutual inductance by using simulation tools.

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	3	-	-	-	3	1	-	-	1	-	-	-
CO2	3	1	-	-	3	-	-	-	3	2	-	-	2	-	-	-
CO3	1	2	-	-	3	-	-	-	3	2	-	-	2	-	-	-
CO4	3	2	-	-	3	-	-	-	3	2	-	-	2	-	-	-
CO5	3	1	-	-	3	-	-	-	3	2	-	-	2	-	-	-
CO6	2	2	-	-	3	-	-	-	2	1	-	-	1	2	1	-

Programme	**CIVIL, EEE, CSE, AIML, IOT, CYS, DS**					
Year & Sem	**II Year – II Semester**					
Course Code	**22UMT03**	**L**	**T**	**P**	**SS**	**C**
Course Name	**MATHEMATICS-III(Partial Differential Equations and Vector Calculus)**	**3**	**1**	**0**	**0**	**3**

COURSE OBJECTIVES:

- To develop the students to solve real time engineering problems using partial differential equations.
- To familiarize the techniques in partial differential equations to describe a wide range of natural processes and other areas of mathematics such as analysis and differential geometry.
- To understand the properties of Beta and Gamma functions with their integral representations.
- To prepare the students to learn the concepts of Vector Calculus.
- To spread out the use of different numerical techniques for carrying out numerical integration.

COURSE OUTCOMES:

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

CO1: Solve problems related to basic linear and non-linear partial differential equations.

CO2: Identify solution methods for partial differential equations that model physical processes.

CO3: Explain the applications and the usefulness of the Beta and Gamma functions by their integral representations and symmetries.

CO4: Interpret the physical meaning of different operators such as gradient, curl, divergence and estimates the work done against a field, circulation and flux using vector calculus.

CO5: Apply Numerical Integration techniques to different engineering problems.

UNIT-I First Order PDE (12 Hours)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –Solutions of first order linear (Lagrange) equation and non linear (standard types) equations. [Test Book (1) : Sections – 17.2, 17.3, 17.5, 17.6]

UNIT -II Higher Order Linear PDE and Applications (14 Hours)

Solutions of linear partial differential equations with constant coefficients – non-homogeneous term of the type e^{ax+by}, $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$. Applications of PDE: Method of separation of Variables –Solution of One – dimensional Wave, Heat and two – dimensional Laplace equation. [Test Book (1) : Sections – 17.8, 17.9, 17.10, 17.11, 18.2, 18.5, 18.6, 18.7]

UNIT III Beta and Gamma Functions (10 Hours)

Beta and Gamma functions – Properties – Relation between Beta and Gamma functions – Evaluation of improper integrals. [Test Book (1) : Sections – 7.14, 7.15, 7.16]

UNIT IV Vector Calculus (16 Hours)

Vector Differentiation: Gradient – Directional derivative – Divergence –Curl – Scalar Potential Vector Integration: Line integral – Work done – Area– Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and problems on above theorems. [Test Book (1) : Sections **–** 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16]

UNIT-V Numerical Integration and Solution of Ordinary Differential Equations (12 Hours)

Numerical Integration - Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Solution of initial value problems by Taylor's series – Picard's method of successive approximations – Euler's method – Runge - Kutta method (fourth order only). [Test Book (1) : Sections **–**30.4, 30.6, 30.7, 30.8, 32.2, 32.3, 32.4, 32.5, 32.6, 32.7,]

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 44^{th} Edition, Khanna Publishers.

Reference Books:

1. **Dr.T.K.V.Iyengar, Dr. B. Krishna Gandhi, S. Ranganadham, Dr. M.V.S.S.N. Prasad**, A text book of Engineering Mathematics, S.Chand Publications.
2. **B.V.Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc.Graw Hill Education.
3. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10^{th} Edition, Wiley - India.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) and Programme Specific Outcomes (PSO's)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO and PSO MAPPINGS

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	3	3	1	-	-	-	-	-	-	-	1	1	1	1	-
CO2	3	3	3	2	-	-	-	-	-	-	-	2	2	1	1	-
CO3	2	3	3	1	-	-	-	-	-	-	-	2	1	-	-	-
CO4	2	3	3	1	-	-	-	-	-	-	-	3	1	1	1	-
CO5	3	3	3	2	-	-	-	-	-	-	-	2	2	1	1	-

Year & Sem	II Year – II Semester					
Course Code	22UEE13	L	T	P	SS	C
Course Name	INDUCTION MOTORS AND SYNCHRONOUS MACHINES	3	1	0	0	3

COURSE OBJECTIVES:

1. Understand the principle of operation and performance of 3-phase induction motor.
2. Quantify the performance of induction motor and induction generator in terms of torque and slip.
3. To understand the torque producing mechanism of a single-phase induction motor.
4. To understand the principle of emf generation, the effect of armature reaction and predetermination of voltage regulation in synchronous generators.
5. To study parallel operation and control of real and reactive powers for synchronous generators. To understand the operation, performance and starting methods of synchronous motors

COURSE OUTCOMES:

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

CO1 : Explain the operation and performance of three phase induction motor.

CO2 :Analyze the torque-speed relation, performance of induction motor and induction generator.

CO3: Implement the starting of single-phase induction motors. Develop winding design and CO4: predetermine the regulation of synchronous generators.

CO5: Explain hunting phenomenon, implement methods of staring and correction of power factor with synchronous motor.

UNIT-I

3-phase Induction Motors-I Constructional details of cage and wound rotor motors – production of rotating magnetic field – principle of operation – Rotor frequency-rotor emf, current, power and power factor at standstill and running conditions – Losses and efficiency– phasor diagram-equivalent circuit.

UNIT-II

3-phase Induction Motors-II Torque equation – expressions for maximum torque and starting torque – torque slip characteristic –crawling and cogging – speed control of induction motor with V/f control method –no load and blocked rotor tests – circle diagram for predetermination of performance of Induction motor.

UNIT–III

Starting methods of 3-phase Induction Motors: starting methods- stator and rotor side –starting current and torque calculations – induction generator operation.

Single phase induction motors: constructional features and equivalent circuit – problems of starting– double field revolving theory - Types of Induction Motor.

UNIT–IV:

Synchronous Generators Constructional features of non-salient and salient pole type armature windings – distributed and concentrated windings – distribution, pitch and winding factors – E.M.F

equation –improvements of waveform and armature reaction – voltage regulation by synchronous impedance method –MMF method and Potier triangle method – phasor diagrams – two Reactance concept for salient pole machines and phasor diagram-Parallel operation with infinite bus and other alternators – synchronizing power – load sharing –control of real and reactive power.

UNIT–V:

Synchronous Motors principle and theory of operation – phasor diagram – starting torque –variation of current and power factor with excitation–Synchronous condenser–mathematical analysis for power developed– hunting and its suppression – Starting methods – applications.

TEXT BOOKS:

1) Electrical Machines by P.S. Bhimbra, Khanna Publishers
2) Electric Machinery by A.E.Fitzgerald, Charles Kingsley, Stephen D.Umans, TMH

REFERENCE BOOKS:

1. Performance and design of AC machines – M.G. Say
2. Alternating Current Machines by A.F.Puchstein, T.C. Lloyd, A.G. Conrad, ASIA Publishing House.
3. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education, 2010.
4. Electrical Machines by R.K.Rajput, Lakshmi publications, 5th edition.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	1	-	-	-	-	-	2	1	2	-	-
CO2	-	2	2	2	-	1	-	-	-	-	-	2	2	3	-	-
CO3	-	2	2	2	-	1	-	-	-	-	-	2	2	3	3	-
CO4	-	2	2	2	-	1	-	-	-	-	-	2	3	2	2	-
CO5	2	-	2	-	-	1	-	-	-	-	-	2	2	3	3	-

Year & Sem	II Year – II Semester					
Course Code	22UEE14	L	T	P	SS	C
Course Name	POWER SYSTEMS - II	3	1	0	0	3

Course Objectives:

1. To understand the concepts of GMD/GMR and to compute inductance/capacitance of transmission lines.
2. To distinguish the short and medium length transmission lines, their models and performance.
3. To understand the performance and modeling of long transmission lines.
4. To learn the effect of travelling waves on transmission lines. To learn the concepts of corona and the factors effecting corona.
5. To understand sag and tension computation of transmission lines as well as to learn the performance of overhead insulators.

Course Outcomes:

After the completion of the course the student should be able to:

CO1 : Calculate parameters of transmission lines for different circuit configurations.
CO2 : Determine the performance of short, medium and long transmission lines.
CO3 : Analyse the effect of travelling waves on transmission lines.
CO4 : Analyse the various voltage control methods and effect of corona.
CO5 : Calculate sag/tension of transmission lines and performance of line insulators

UNIT-I

Transmission Line Parameters: Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition. Calculation of capacitance for 2 wire and 3 wire systems, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, effect of ground on capacitance.

UNIT-II

Performance of Short and Medium Transmission Lines: Classification of Transmission Lines - Short, medium and long line and their model representations -Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of short and medium types of lines.

UNIT – III

Performance of Long Transmission Lines: Performance of Long Transmission Lines: Long Transmission Line - Rigorous Solution, evaluation of A, B, C, D Constants, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves.

Power System Transients: Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions

UNIT-IV

Factors Governing the Performance of Transmission Line: Skin and Proximity effects - Description and effect on Resistance of Solid Conductors - Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line.

Corona: Description of the Corona phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT-V

Overhead Line Insulators: Types of Insulators, String efficiency and Methods for improvement, voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

Sag and Tension Calculations: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, stringing charts and Sag Template.

TEXT BOOKS:

1) "C. L. Wadhwa", "Electrical power systems", New Age International (P) Limited Publishers, 1998.
2) "Grainger and Stevenson", "Power Systems Analysis", Mc Graw Hill, 1 st Edition 2003.
3) "M. L. Soni, P. V. Gupta, U.S. Bhatnagar and A. Chakrabarthy", Power System Engineering, Dhanpat Rai & Co Pvt. Ltd, 2009.

REFERENCE BOOKS:

1. "I. J. Nagarath& D. P Kothari" , "Power System Engineering", TMH, 2nd Edition 2010
2. "B. R. Gupta", "Power System Analysis and Design", Wheeler Publishing, 1998.
3. "AbhijitChakrabarti and SunithaHalder", "Power System Analysis Operation and control", PHI, 3rd Edition, 2010

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	2	2	2	-	1	-	-	-	-	-	2	2	-	2	-
CO2	-	2	2	2	-	1	-	-	-	-	-	2	2	-	3	-
CO3	-	2	2	2	-	1	-	-	-	-	-	2	2	-	2	-
CO4	-	2	2	2	-	1	-	-	-	-	-	2	3	-	3	-
CO5	-	2	2	2	-	1	-	-	1	1	-	2	2	-	2	-

Year & Sem	II Year – II Semester					
Course Code	22UEE15	L	T	P	SS	C
Course Name	CONTROL SYSTEMS	3	1	0	0	3

COURSE OBJECTIVES:

1. To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
2. To analyze the time response of first and second order systems and improvement of performance using PI, PD, PID controllers. To investigate the stability of closed loop systems using Routh's stability criterion and root locus method.
3. To understand basic aspects of design and compensation of LTI systems using Bode diagrams.
4. To learn Frequency Response approaches for the analysis of LTI systems using Bode plots, polar plots and Nyquist stability criterion.
5. To learn state space approach for analysis of LTI systems and understand the concepts of controllability and observability.

COURSE OUTCOMES:

CO1 :Determine the transfer function and recognize different mathematical modelling of physical systems.
CO2 : Demonstrate the time response analysis, PID controllers and investigate the stability of the system in time domain
CO3 : Use frequency response analysis to investigate the stability of the system in frequency domain.
CO4 : Appliying bode plots for design and analysis of compensators applications.
CO5 : Analyze linear control system using the state space technique.

UNIT – I

Mathematical Modelling of Control Systems: Classification of control systems - open loop and closed loop control systems and their differences - Feedback characteristics - transfer function of linear system, differential equations of electrical networks, translational and rotational mechanical systems - transfer function of Field current and Armature voltage controlled DC servo motor, AC Servo Motor, Speed-Torque Characteristics - block diagram algebra - signal flow graph – reduction using Mason's gain formula.

UNIT-II

Time Response Analysis and Controllers: Standard test signals – time response of first and second order systems – time domain specifications - steady state errors and error constants - effects of proportional (P) - proportional integral (PI) - proportional derivative (PD) - proportional integral derivative (PID) systems.

UNIT–III

Stability Assessment Techniques: The concept of stability – Routh's stability criterion – limitations of Routh's stability, root locus concept – construction of root loci, Effect of addition of Poles and Zeros to the transfer function.

Frequency Response Analysis: Frequency domain specifications – Bode plots – transfer function from the Bode plots –Polar plots, Nyquist stability criterion.

UNIT–IV

Classical Control Design Techniques: Concept of Compensation, Types of Compensators-Lag, lead and lag-lead, physical realisation - design of compensators using Bode plots.

UNIT–V

State Space Analysis of Linear Time Invariant (LTI) Systems: Concepts of state - state variables and state model - state space representation of transfer function - diagonalization using linear transformation - solving the time invariant state equations - State Transition Matrix and its properties-concepts of controllability and observability.

TEXT BOOKS

1) Automatic Control Systems– by Farid Golnaraghi and Benjamin C. Kuo – John wiley and sons., 9th edition, 2010.
2) Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited 2009, Publishers, 5th edition.
3) Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.

REFERENCE BOOKS

1. Control Systems principles and design by M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4 th Edition, 2012.
2. Control Systems Engineering. by Norman S.Nise 8th Edition – John Wiley 2019
3. Control Systems Engineering by S.Palani, 2nd edition, Tata Mc Graw Hill Publications, 2009

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	-	1	-	-	-	-	-	3	3	1	1	2
CO2	3	1	3	3	-	1	-	-	1	-	-	3	3	1	1	-
CO3	3	3	3	3	-	1	-	-	-	-	-	3	3	1	1	-
CO4	3	3	3	3	-	1	-	-	-	-	-	3	3	1	1	-
CO5	3	3	3	3	-	1	-	-	-	-	-	3	3	1	1	-

Year & Sem	II Year – II Semester					
Course Code	22UEC05	L	T	P	SS	C
Course Name	SWITCHING THEORY AND LOGIC DESIGN	3	1	0	0	3

COURSE OBJECTIVES: This course will enable the students to

- Study about the number systems, complements, signed binary numbers and binary codes.
- Study about Boolean algebra; illustrate map method for minimization of switching functions.
- Design combinational logic circuits like Adders, Subtractors, Decoders, and Encoders.
- Describe Latches and Flip-Flops
- Learn about counters and registers.

UNIT- I: Number Systems

Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction, 4-bit binary codes: BCD, EXCESS 3, alphanumeric codes, 9's complement, 2421, etc.

UNIT -II: **Boolean algebra**

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical Forms, Minterms and Maxterms, Karnaugh Maps-3,4 variables, Don't – Care terms, POS and SOP Simplification, NAND/ NOR Implementation, Logic gates.

UNIT –III: **Combinational Logic**

Analysis and design procedure for combinational logic, Adders and Subtractors, Binary Multiplier, Decoders, Encoders, Multiplexers, De-multiplexers, Priority Encoder, Code Converters, Magnitude Comparator.
Programmable logic devices: PROM, PAL, PLA

UNIT- IV: Synchronous Sequential Logic

Introduction to Sequential Circuits: Latches, Flip-Flops, RS- Latch Using NAND and NOR Gates, Truth Tables. RS, JK, T and D Flip Flops, Truth and Excitation Tables, Conversion of Flip Flops.

UNIT -V: Registers and Counters

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter.

COURSE OUTCOMES:

After completion of this course, the students will be able to

- Define different number representation and conversion from one radix to other.
- Explain the minimization techniques using Boolean algebra and K-map method.
- Analyze and design the combinational logic circuits.
- Design the sequential circuits using Flip-Flops.
- Design the registers and counters.

TEXT BOOKS:

1. Digital Design, M.Morris Mano, Michael D Ciletti, PEA.
2. Switching and finite automata theory Zvi.KOHAVI, Niraj.K.Jha 3rdEdition,Cambridge UniversityPress,2009

3. Switching theory and logic design by Hill and Peterson**,** Mc-Graw Hill TMH edition, 2012.

REFERENCE BOOKS:

1. Modern Digital Electronics, R.P. Jain, TMH.
2. Switching Theory and Logic Design by A.AnandKumar, PHI Learningpvtltd, 2016.
3. Digital fundamentals by Thomas L.Floyd, Pearson EDU India.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3								3			2	2			
CO2	3	3		2								2	3			
CO3	3	3										2	2			2
CO4	3	3										2	3			2
CO5	3	3										2	3			2

Year & Sem	II Year - I Semester				
Course Code	22UEN04	L	T	P	C
Course Name	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	0

COURSE OBJECTIVES:

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world- view and basic principles of Yoga and holistic health care system

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:
CO1 : Understand the significance of Indian Traditional Knowledge
CO2 : Classify the Indian Traditional Knowledge
CO3 : Compare Modern Science with Indian Traditional Knowledge system.
CO4 : Analyze the role of Government in protecting the Traditional Knowledge
CO5 : Understand the impact of Philosophical tradition on Indian Knowledge System.

UNIT I

Introduction to Traditional Knowledge: Define Traditional Knowledge- Nature and Characteristics-Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in global economy.

UNIT II

Basic structure of Indian Knowledge System: Astadash Vidya- 4 Ved - 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi), 6 vedanga (Shisha, Kalppa, Nirukha,Vykaran, Jyothisha & Chand),4 upanga (Dharmashastra, Meemamsa, purana & Tharka Shastra).

UNIT III

Modern Science and Indian Knowledge System-Indigenous Knowledge, Characteristics- Yoga and Holistic Health care-cases studies.

UNIT IV

Protection of Traditional Knowledge: The need for protecting traditional knowledge -Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.

UNIT V

Impact of Traditions: Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh - Indian Artistic Tradition - Chitrakala, Moorthikala, Vasthukala , Sthapthya, Sangeetha, NruthyaYevamSahithya

TEXT BOOKS:

1. Traditional Knowledge System in India, by AmitJha, 2009.

2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012.
3. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, BharatiyaVidya
4. Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan
5. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
6. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

WEB RESOURCES:

1. https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
2. http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf
3. https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_text.pdf

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	2	-	-	-	-	-	2				
CO2	2	-	-	-	-	2	-	-	-	-	-	2				
CO3	2	-	-	-	-	2	-	-	-	-	-	2				
CO4	2	-	-	-	-	2	-	-	-	-	-	2				
CO5	2	-	-	-	-	2	-	-	-	-	-	2				

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	II Year – II Semester					
Course Code	22UEE16	L	T	P	SS	C
Course Name	Induction Motors and Synchronous Machines Lab	0	0	3	0	1.5

COURSE OBJECTIVES:

1. To control the speed of three phase induction motors.
2. To determine /predetermine the performance three phase and single-phase induction motors.
3. To improve the power factor of single-phase induction motor.
4. To predetermine the regulation of three–phase alternator by various methods, find Xd/ Xq ratio of alternator and asses the performance of three–phase synchronous motor.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

CO1: Assess the performance of single phase and three phase induction motors.
CO2: Control the speed of three phase induction motor.
CO3: Predetermine the regulation of three–phase alternator by various methods.
CO4: Find the Xd/ Xq ratio of alternator and asses the performance of three–phase synchronous motor.
CO5: Determine the performance single phase AC series motor.

Any 10 of the following experiments are to be conducted:

1. Brake test on three phase Induction Motor
2. No–load & Blocked rotor tests on three phase Induction motor
3. Speed control of induction motor by V/f method.
4. Equivalent circuit of single-phase induction motor
5. Power factor improvement of single-phase induction motor by using capacitors and load test on single-phase induction motor.
6. Starting methods of a capacitor start and capacitor start run single-phase Induction motor.
7. Brake test on single-phase Induction Motor
8. Determination of efficiency of three-phase alternator by loading with three phase induction motor
9. Regulation of a three –phase alternator by synchronous impedance & m.m.f. Methods
10. Regulation of three–phase alternator by Potier triangle method
11. V and Inverted V curves of a three—phase synchronous motor.
12. Determination of Xd and Xq of a salient pole synchronous machine
13. Parallel operation of three-phase alternator.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	3	-	-	-	1	-	-	3	-	-	2	3	3	-	-
CO2	2	-	3	-	-	1	-	-	3	-	-	2	3	2	-	-
CO3	-	2	3	-	-	1	-	-	3	-	-	2	2	3	-	-
CO4	2	-	-	-	-	1	-	-	3	-	-	2	3	3	-	-
CO5	-	2	-	2	-	1	-	-	3	-	-	2	3	2	-	-

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	II Year – I Semester					
Course Code	22UEC06	L	T	P	SS	C
Course Name	SWITCHING THEORY AND LOGIC DESIGN LAB	0	0	3	0	1.5

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Verification of truth tables of Logic gates
2. Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive OR (vi) Exclusive NOR
3. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
4. Verification of functional table of 3 to 8 line Decoder/De-multiplexer
5. Design BCD Adder Circuit and Test the Same using Relevant IC
6. Four variable logic function verification using 8 to1 multiplexer.
7. Design full adder circuit and verify its functional table.
8. Verification of functional tables of
9. (i)JK Edge triggered Flip–Flop (ii) JK Master Slav Flip–Flop (iii) D Flip-Flop
10. Design a four bit ring counter and Johnson's counter using D Flip–Flops/JK Flip Flop and verify output
11. Verify the operation of decade counter using relevant IC
12. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
13. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T- Flip- Flops and Test it with a low frequency clock and sketch the output wave forms.
14. Design MOD–8 synchronous counter using T Flip- Flop and verify the result and Sketch the output wave forms.
    (a) Draw the circuit diagram of a single bit comparator and test the output
    (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.

COURSE OBJECTIVES:

1) To study about basic IC's and verification of their truth table.
2) To know about relevant IC's and designing combinational and sequential circuits.

COURSE OUTCOMES:

At the end of the course, students will able to

1) Know how to handle with 74 IC family and verification
2) How to design combinational circuit with IC's
3) How to design sequential circuits with IC's
4) And analyzing each IC with their functional table.

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	-	3	-	-	-	2	-	-	-
CO2	3	-	-	-	-	-	-	3	-	-	-	2	-	-	-
CO3	2	-	-	-	-	-	-	3	-	-	-	1	-	-	-
CO4	3	-	-	-	-	-	-	3	-	-	-	2	-	-	-

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	II Year – II Semester					
Course Code	22UEE17	L	T	P	SS	C
Course Name	CONTROL SYSTEMS AND SIMULATION LAB	0	0	3	0	1.5

COURSE OBJECTIVES:

1. To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors and Synchros.
2. To understand time and frequency responses of control system with and without controllers and compensators.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

CO1: Analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and synchros.

CO2: Design P, PI, PD and PID controllers& control the temperature using PID controller

CO3: Design lag, lead and lag–lead compensator.

CO4: Control the performance of D.C and A.C Servo Motor.

CO5: Test the controllability and observability.

Any 10 of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Effect of P, PD, PI, PID Controller on a second order systems
4. Design of Lag and lead compensation – Magnitude and phase plot
5. Transfer function of DC motor
6. Temperature controller using PID
7. Characteristics of magnetic amplifiers
8. Speed-Torque Characteristics of AC servo motor
9. Speed-Torque Characteristics of Armature controlled DC servo motor
10. Bode Plot, Root locus, Nyquist Plots for the transfer functions of systems up to 5th order using MATLAB.
11. Controllability and Observability Test using MAT LAB.
12. Block Diagram Representation of Field Controlled DC servo Motor Using Simulink

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	3	-	-	-	1	-	-	3	-	-	2	1	2	-	2
CO2	-	-	3	-	-	1	-	-	3	-	-	2	-	-	-	-
CO3	-	-	3	-	-	1	-	-	3	-	-	2	-	-	-	-
CO4	2	-	-	2	-	1	-	-	3	-	-	2	-	-	-	-
CO5	2	2	-	2	-	1	-	-	3	-	-	2	-	-	-	-

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Year & Sem	**II Year – II Semester**					
Course Code	**22UEN09**				**SS**	**C**
Course Name	**Skill Course in Employability Skills**				**0**	**1**

PREAMBLE: The aim of this course is to enhance learner's knowledge of both soft skills and IT related skills so as to develop attributes that enhances interpersonal communication, earning power and job performance.

COURSE OBJECTIVES:

To enhance the Numerical ability skills such as addition, subtraction, multiplication, division, calculation of percentages, average etc.

To develop the problem solving skills on time, distance and speed calculations, to improve the basic mathematical skills on arithmetic ability.

To analyze a candidate's ability to relate a certain given group of items and illustrate it diagrammatically.

To develop interpersonal skills and adopt good leadership behavior for empowerment of self and others.by managing stress and time effectively.

To prepare good resume, prepare for interviews and group discussions, and to explore desired career opportunities.

UNIT - I

Numerical ability

Number system, HCF & LCM, Average, Simplification, Problems on numbers Ratio & Proportion, Partnership, Percentages, Profit & Loss

UNIT - II Arithmetical ability

Problems on ages, Time & Distance, Problems on boats &Steams, Problems on Trains, Time & Work,

Pipes & Cistern, Chain Rule.

Allegation, Simple interest and compound interest, Races & Games of skills, Calendar and Clock.

UNIT - III

Logical ability: Permutations and Combination and Probability.

Mensuration: Geometry, Areas, Volumes,

Data interpretation: Tabulation, Bar graphs, Pie charts, line graphs

UNIT - IV

Self-Management Skills

Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

Etiquette Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

UNIT - V

Job-Oriented Skills

Group Discussion, Mock Group Discussions, Resume Preparation, Interview Skills, Mock Interviews

Text Books:

1) B K. Mitra, Personality Development and Soft Skills, Oxfo rd University Press, 2011.

2) S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

3) R.S.Aggarwal, A Modern Approach to Verbal & Non Verbal Reasoning, S.Chand &

Company Ltd., 2018.

4) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1																
CO2																
CO3																
CO4																
CO5																

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	**III Year – I Semester**					
Course Code	**22UEE26**	**L**	**T**	**P**	**SS**	**C**
Course Name	**POWER ELECTRONICS**	3	0	0	0	3

COURSE OBJECTIVES

1. To know the characteristics of various power semiconductor devices.
2. To learn the operation of single phase full–wave converters and perform harmonic analysis of input current.
3. To learn the operation of three phase full–wave converters and AC/AC converters.
4. To learn the operation of different types of DC-DC converters.
5. To learn the operation of PWM inverters for voltage control and harmonic mitigation.

COURSE OUTCOMES

1. Understand the basic operation of various power electronic devices and their characteristics, firing scheme.
2. Apply the basic knowledge of control of converters to obtain desired voltage for different loads.
3. Apply the basic knowledge of control of various types inverters to obtain desired shape of AC output voltage and analyze its THD.
4. Choose appropriate topology of DC-DC converter for the given application and design a suitable filter to obtain desired response.
5. Analyze the operation and obtain load voltage-current expressions for AC to AC converters.

UNIT-I

Principle of operation of SCR, static, dynamic characteristics, Two-Transistor analogy of SCR, Triggering Methods (R, RC and UJT) and turnoff methods of SCR, - Snubber Circuit, Necessity of series and parallel connections of SCR.
Static and Dynamic Characteristics of Power MOSFET and Power IGBT – Gate Driver Circuits for Power MOSFET and IGBT -Applications and Numerical problems

UNIT-II

Single phase half wave and full wave-controlled rectifiers: Half wave controlled rectifier, semi controlled and fully controlled bridge rectifiers with R, RL and RLE loads- Continuous and Discontinuous conduction - effect of source inductance, Harmonic Analysis- Power factor and Distortion Factor. Single phase dual converter.
Three phase full wave-controlled rectifiers: Semi controlled and fully controlled bridge converters with R and RL loads- effect of source inductance, three phase dual converter. - Applications - Numerical Problems.

UNIT-III

Series inverters, parallel inverters, Single phase half and full bridge inverters, three phase VSI (180 &120-degree conduction modes), CSI, Comparison between VSI & CSI. Voltage control techniques for inverters: Pulse-width modulation techniques - single pulse, multi-pulse, sinusoidal pulse width modulation techniques - Applications- Numerical Problems.

UNIT-IV

Operation of Basic Chopper – Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM), Derivation of average load

voltage and current expressions, Derivation of Filter design, principal of operation of Four quadrant chopper. Applications - Numerical Problems.

UNIT-V

Single-phase AC-AC power control by phase control with R and RL loads - Expression for rms output voltage-applications -TRIAC modes of operation and its applications– Single-phase step down and step up Cyclo-converter - applications- Numerical Problems.

TEXTBOOKS:

1. P.S. Bhimbra,'Power Electronics', Khanna Publications, 5th edition, 2018
2. Muhammad H Rashid, "Power Electronics", 3/e, Pearson Education, 2004.

REFERENCES:

1. M D Singh, K B Khanchandani, "Power Electronics", 3/e, Tata MC Graw Hill, 2008.
2. NedMohan, ToreM.Undeland, William P.Robbins, "Power Electronics Converters Applic ations and Design", McGraw-Hill Education, 3rd edition, 2007
3. P.C.Sen Power Electronics , Tata McGraw-Hill Publishing, 2nd edition ,30th reprint -2008

CO-PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	-		**1**	**3**	**1**	**1**	-
CO2	**3**	-	-	-	-	**1**	**1**					**2**	**3**	**1**	**1**	
CO3	**3**	**2**				**1**	**1**					**1**	**3**	**1**	**1**	
CO4		**3**										**1**	**3**	**1**	**1**	
CO5						**3**	**3**		**3**	**3**		**3**	**3**	**1**	**1**	

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE19	L	T	P	SS	C
Course Name	Electrical Measurements and Instrumentation	3	0	0	0	3

Course Objectives:

1. To understand and analyze the factors that affect the various measuring Units.
2. To choose the appropriate meters for measuring of voltage, current, power, power factor and energy qualities & understand the concept of standardization.
3. Describe the operating principle of AC & DC bridges for measurement of resistance, inductance and capacitance.
4. To understand the concept of the transducer and their effectiveness in converting from one form to the other form for the ease of calculating and measuring purposes.
5. To understand the operating principles of basic building blocks of digital systems, record and display Units

Course Outcomes:

After the completion of the course the student should be able to:

1. Know the construction and working of various types of analog instruments.
2. Describe the construction and working of wattmeter and power factor meters
3. Know the construction and working various bridges for the measurement resistance - inductance and capacitance
4. Know the operational concepts of various transducers
5. Know the construction and operation digital meters

UNIT - I

Analog Ammeter and Voltmeters:

Classification – deflecting - control and damping torques - – PMMC - moving iron type and electrostatic instruments - Construction - Torque equation - Range extension - Errors and compensations - advantages and disadvantages. Instrument transformers: Current Transformer and Potential Transformer-construction - theory - errors-Numerical Problems.

UNIT - II

Analog Wattmeter, Energy meter and Power Factor Meters:

Electrodynamometer type wattmeter (LPF and UPF) - Power factor meters: Dynamometer and M.I type (Single phase and Three phase) - Construction - theory - torque equation - advantages and disadvantages, Induction Type Energy Meters-Construction and working - Errors and Compensation– Numerical Problems.

Potentiometers:

Introduction to DC and AC Potentiometers – Construction-working – Applications - Numerical Problems.

UNIT – III

Measurements of Electrical parameters:

DC Bridges: Method of measuring low - medium and high resistance - sensitivity of Wheat stone's bridge - Kelvin's double bridge for measuring low resistance - Loss of charge method for measurement of high resistance - Megger – measurement of earth resistance - Numerical Problems.

AC Bridges: Measurement of inductance and quality factor - - Maxwell's bridge - - Hay's bridge - - Anderson's bridge. Measurement of capacitance and loss angle - - Desauty's bridge - Schering Bridge - Wien's bridge - Wagner's earthing device - - Numerical Problems.

UNIT – IV

Sensors & Transducers

Definition - Classification - Resistive - Inductive and Capacitive Transducer - LVDT - Strain Gauge - Thermistors - Thermocouples - Piezo electric and Photo Diode Transducers - Hall effect sensors - Numerical Problems

UNIT – V

Digital meters

Digital Voltmeters – Successive approximation DVM - Ramp type DVM and Integrating type DVM – Digital frequency meter - Digital multimeter - Digital tachometer - Digital Energy Meter - Q meter - Power Analyzer. CRO- measurement of phase difference & Frequency using lissajious patterns - Numerical Problems

TEXT BOOKS:

1. Electrical Measurements and measuring Instruments by E.W. Golding and F.C.Widdis - 5 th Edition - Wheeler Publishing.
2. Modern Electronic Instrumentation and Measurement Techniques by A.D. Helfrick and W.D. Cooper - PHI – 1st Edition - 2015.

REFERENCE BOOKS:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications - 19th revised edition - 2022.
2. Electrical and Electronic Measurements and instrumentation by R.K.Rajput - S.Chand - 3 rd edition.
3. Electrical Measurements by Buckingham and Price - Prentice – Hall
4. Electrical Measurements by Forest K. Harris. John Wiley and Sons

CO – PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	-	-	-	-	-	-	-	-	2	2	1	3	
CO2	2	1	1	2	-	-	-	-	-	2	-	2	1	2	2	
CO3	3	1	1	2	-	-	-	-	-	-	-	2	2	1	3	
CO4	2	2	1	2	-	-	-	-	-	2	-	-	2	2	2	
CO5	2	2	1	-	-	-	-	-	-	2	-	-	2	1	2	

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE2	L	T	P	SS	C
Course Name	Power system Analysis	3	0	0	0	3

COURSE OBJECTIVES:

1. To develop the impedance diagram (p.u) and formation of Ybus
2. To learn the different load flow methods.
3. To learn the Zbus building algorithm.
4. To learn short circuit calculation for symmetrical faults
5. To learn the effect of unsymmetrical faults and their effects.
6. To learn the stability of power systems and method to improve stability.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Draw impedance diagram for a power system network and calculate per Unit quantities.
2. Apply the load flow solution to a power system using different methods.
3. Form Zbus for a power system networks and analyse the effect of symmetrical faults.
4. Find the sequence components for power system Components and analyse its effects of unsymmetrical faults.
5. Analyze the stability concepts of a power system.

UNIT - I

Circuit Topology & Per Unit Representation: Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y bus matrix by singular transformation and direct inspection methods – Per Unit Quantities–Single line diagram – Impedance diagram of a power system – Numerical Problems.

UNIT - II

Power Flow Studies: Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) – Decoupled and Fast Decoupled methods – Algorithmic approach – Numerical Problems on 3–bus system only.

UNIT - III

Formation of Z bus: Algorithm for the Modification of Z-bus Matrix (without mutual impedance) – Numerical Problems.

Types of faults: Open circuit, Shor circuit faults: Asymmetrical faults (LG– LL and LLG) and symmetrical faults (LLL, LLLG) on unloaded alternator-Numerical problems.

UNIT – IV

Symmetrical Components: Definition of symmetrical components – symmetrical components of unbalanced three phase systems – Power in symmetrical components – **Sequence impedances and Sequence networks:** Synchronous generator – Transmission line and transformers – Numerical Problems.

Fault Analysis: Reactance's of Synchronous Machine – Three Phase Short Circuit Currents - Short circuit MVA calculations for Power Systems – Numerical Problems.

UNIT - V

Power System Stability Analysis: Elementary concepts of Steady state – Dynamic and Transient Stabilities – Swing equation – Steady state stability – Equal area criterion of stability – Applications of Equal area criterion – Factors affecting transient stability – Methods to improve steady state and transient stability – Numerical problems

TEXT BOOKS:

1. Power System Analysis by Grainger and Stevenson - Tata McGraw Hill.2003
2. Modern Power system Analysis – by I.J.Nagrath & D .P.Kothari: Tata McGraw–Hill Publishing Company - 3 rd edition - 2007.

REFERENCE BOOKS:

1. Power System Analysis – by A.R.Bergen - Prentice Hall - 2 nd edition - 2009.
2. Power System Analysis by HadiSaadat – Tata McGraw–Hill 3rd edition - 2010.
3. Power System Analysis by B.R.Gupta - A H Wheeler Publishing Company Limited - 2005.
4. Power System Analysis and Design Power System Analysis by B.R.Gupta by J.Duncan Glover - M.S.Sarma - T.J.Overbye – Cengage Learning publications - 5 th edition - 2011

CO – PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	-	-	-	-	2	2				
CO2	3	3	-	2	3	-	-	-	-	2	2	2				
CO3	2	2	-	1	-	-	-	-	-	-	-	2				
CO4	2	3	2	2	2	-	-	-	-	2	2	3				
CO5	3	3	-	2	3	-	-	-	-	3	3	3				

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE22	L	T	P	SS	C
Course Name	CONCEPTS OF CONTROL SYSTEMS (Open Elective -I)	3	0	0	0	3

COURSE OBJECTIVES:

1. To realize the basic concepts of mathematical modelling of physical systems
2. To significance of transfer function and obtain it using block diagram reduction and signal flow graph.
3. Analyze the system in time domain and asses the stability
4. Analyze the system in frequency domain and asses the stability
5. Understand the state space representation of a physical system with different models and realize controllability and observability

COURSE OUTCOMES

1. Understand various models to represent the linear time invariant systems
2. Apply the knowledge of engineering fundamentals in control systems, modeling transfer function/state space of the systems and characterize them.
3. Interpret the LTI system's performance in time and frequency domains.
4. Analyze the transfer function model of linear control system and stability using various tools
5. Examine the state of a linear control system using state space representation.

UNIT -I

Mathematical Modelling of Control Systems: Classification of control systems, Mathematical models – mechanical systems (Translational and Rotational), Concept of transfer function - Finding Transfer functions for electrical networks and mechanical systems. Effects of feedback.

UNIT -II

Transfer function representation: Transfer function of DC servo motor – AC servo motor. Construction and working of synchro transmitter and receiver. Block diagram algebra - reduction techniques, representation by signal flow graph – reduction using mason's gain formula.

UNIT -III

Time Response Analysis (descriptive treatment only): Step response of first order, second order systems, time domain specifications, steady state error and static error constants.
Stability Analysis: The concept of stability – Routh's stability criterion –limitations of Routh's stability, Root locus concept – construction of root loci (simple problems).

UNIT -IV

Frequency Response Analysis & Stability: Introduction, frequency domain specifications (descriptive treatment only). Stability analysis of Bode plots – Phase margin a Gain margin (simple problems).

UNIT -V

State Space Analysis of LTI Systems: Concepts of state, state variables and state model, Conversion of state variable model to transfer function model and transfer function form to state variable form (controllable canonical form), solution of linear homogenous state equations - state transition matrix (Laplace transform method) and its properties, Kalman's test of controllability and observability.

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 5 th edition, 2010.
2. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited 6 th edition, 2009.

REFERENCE BOOKS:

1. Control Systems principles and design by M.Gopal - Tata Mc Graw Hill education Pvt Ltd. - 4th Edition.
2. Control Systems by Manik Dhanesh N - Cengage publications.
3. Control Systems Engineering by I.J.Nagarath and M.Gopal - Newage International Publications - 5th Edition.
4. Control Systems Engineering by S.Palani - Tata Mc Graw Hill Publications.

CO-PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	-	-	-	**1**	-	-	-
CO2	**3**	-	-	-	-	**1**	-	-	-	-	-	-	**2**	-	-	-
CO3	**3**												**1**	-	-	-
CO4		**3**	**1**	**1**									**1**	-	-	-
CO5		**3**		**1**							**1**		**1**	-	-	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE21	L	T	P	SS	C
Course Name	Fundamentals of Power electronics (Open Elective -I)	3	0	0	0	3

COURSE OBJECTIVES:

1. Understand the performance of various power electronic devices.
2. Understand the VI characteristics of SCR and TRIAC.
3. Apply the single-phase controlled rectifier circuits.
4. Understand choppers circuits
5. Understand the performance of AC voltage controllers.

COURSE OUTCOMES:

At the end of the course students will be able to

1. Understand the characteristics and performance of various power electronic devices.
2. Understand the VI characteristics of SCR and TRIAC.
3. Apply the single-phase controlled rectifier circuits.
4. Understand choppers circuits and AC voltage controllers

UNIT-I

Introduction to power electronics, scope and applications, principle and operation of BJT, MOSFET and IGBT

UNIT-II

Power semiconductor switches and their V-I characteristics-diodes, SCR, TRIAC, Thyristor ratings and protection.

UNIT-III

Principles of single-phase fully-controlled converter with R, RL, and RLE load, Principles of single-phase half-controlled converter with RL and RLE load, Single phase dual converters.

UNIT-IV

Introduction, Basic principles of step-down and step-up operation, chopper classification study of Buck, Boost and Buck-Boost regulators

UNIT-V

Introduction, principle of operation of single-phase voltage controllers for R, R-L & R-L-E loads and its applications, Principle of operation of single phase cyclo converters

TEXT BOOKS:

1. Power Electronics: Circuits, Devices & Applications, M.H. Rashid, Pearson Education India, 2017.
2. Power Electronics: Converters, Applications and Design, N. Mohan and T. M. Undeland, John Wiley & Sons,3rd edition, 2007.

REFERENCES:

1. Fundamentals of Power Electronics, R. W. Erickson and D. Maksimovic, Springer Science & Business Media, 2007.

2. Power Electronics, Dr. P.S. Bhimbra, Khanna Publishers, 2009.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-
CO2	3	-	-	-	-	1	1	-	-	-	-	2	-	1	1	-
CO3	3	2	-	-	-	1	1	-	-	-	-	1	-	1	1	-
CO4	-	3	-	-	-			-	-	-	-	1	-	1	1	-
CO5	-	-	-	-	-	3	3	-	3	3	-	3	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE23	L	T	P	SS	C
Course Name	OPTIMIZATION TECHNIQUES (Open Elective -I)	3	1	0	0	3

COURSE OBJECTIVES:

1. To know the importance of adopting optimization techniques in day to day life.
2. To analyse the importance of various types of constraints at various stages.
3. To learn more on linear & nonlinear programming concepts.
4. To analyse the significance of transportation problem.
5. To learn the concepts of dynamic programming.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Understand basics and theoretical concepts of optimization techniques. (L2)
2. Apply mathematical principles to formulate optimization problems. (L3)
3. Investigate the different classical methods to solve linear, non-linear programming problems and transportation problems. (L4)
4. Solve Linear Programming Problem using dynamic programming. (L3)
5. Analyze the performance of modern heuristic methods to solve optimization problems. (L4)

UNIT – I

Introduction to optimization: Statement of an optimization problem, classification of optimization problems, optimization techniques, Engineering applications of optimization

UNIT – II

Linear Programming (LP): Introduction and formulation of models, standard form of Linear Programming Problem (LPP), assumptions in LPP, simplex method, simplex method using artificial variables, degeneracy in simplex method, duality, dual simplex method and sensitivity analysis change in coefficients of objective function method.

UNIT – III

Transportation Problem: Vogel‟s approximation method, modified distribution method.
Non-linear Programming: Unconstrained problems of maxima and minima and constrained problems of maxima and minima, Lagrangian method and Kuhn Tucker conditions

UNIT – IV

WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel.

PROJECT MANAGEMENT: Basics for construction of network diagram, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM) – PERT Vs. CPM, determination of floats-Project crashing and its procedure

UNIT - V

DYNAMIC PROGRAMMING: Introduction – Bellman's principle of optimality – applications of dynamic programming-shortest path problem – linear programming problem.

SIMULATION: Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages.

TEXT BOOKS:

1. S.S.Rao, "Engineering Optimization: Theory and Practice",New Age International publishers, 5 th edition., 2019
2. S.D.Sharma, "Operations Research", Kedar Nath Ram Nath and Co, 4th Edition, 2014.
3. K.Deb, "Optimization for Engineering Design: Algorithms and Examples", Prentice Hall of India Learning Pvt. Ltd., 2nd edition. 2012.

REFERENCE BOOKS:

1. K.V.Mittal, C. Mohan, "Optimization Methods in Operations Research and Systems Analysis", New Age International, 1 st edition, 1996.
2. H.A.Taha, "Operations Research: An introduction", Prentice Hall of India Learning Pvt. Ltd., 10th edition, 2019.
3. D.P.Kothari, J.S.Dhillon, "Power System Optimization", Prentice Hall of India Learning Pvt. Ltd., 2ndedition, 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1																
CO2																
CO3																
CO4																
CO5																
CO6																

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE24	L	T	P	SS	C
Course Name	RENEWABLE ENERGY SOURCES (Open Elective -I)	3	0	0	0	3

COURSE OBJECTIVES:

1. To understand the basic concepts on wind energy systems with concept on aerodynamics, horizontal and vertical axis wind turbines.
2. To understand the various relations between speed, power and energy in the wind systems.
3. It provides the knowledge in fundamentals of solar energy systems, various components of solar thermal systems, applications in the relevant fields and design of PV systems.
4. To understand the Hydel system components and their design concepts. To get an idea on different other sources like tidal, geothermal and gas-based Units.
5. To understand the use of various renewable sources as distributed generators.

COURSE OUTCOMES:

1. Understand various renewable sources for power generation. (L2)
2. Analyse the generation of wind energy and its integration with grid. (L4)
3. Develop the suitable mechanism to harvest and convert solar photo voltaic energy with suitable collectors. (L3)
4. Analyse biomass, geothermal and hydel energy conversion and operation (L4)
5. Interpret ocean energy harvesting techniques, fuel cells energy storage systems (L3)

UNIT-I

Environmental consequences of fossil fuel use, Importance of renewable sources of energy, Sustainable Design and development, Types of Renewable Energy sources and its limitations, Present Indian and international energy scenario of conventional and RE sources.

UNIT-II

Power in the Wind – Types of Wind Power Plants (WPPs)–Components of WPPs-Working of WPPs-Siting of WPPs-Grid integration issues of WPPs.

UNIT-III

Solar Radiation, Radiation Measurement, Solar Thermal Power Plant, Central Receiver Power Plants, Solar Ponds. Thermal Energy storage system with PCM- Solar Photovoltaic systems: Basic Principle of SPV conversion – Types of PV Systems- Types of Solar Cells, Photovoltaic cell concepts: Cell, module, array, PV Module I-V Characteristics, Efficiency & Quality of the Cell, series and parallel connections, maximum power point tracking, Applications.

UNIT-IV

Introduction-Biomass resources –Energy from Bio mas: conversion process, Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal Electricity. Mini/micro hydro power: Classification of hydropower schemes, Classification of water turbine, Turbine theory, Essential components of hydroelectric system.

UNIT-V

Tidal Energy: Energy from the tides, Barrage and Non-Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC)- Hydrogen

Production and Storage- Fuel cell: Principle of working- various types – construction and applications. Energy Storage System.

TEXT BOOKS:

1. Bin_Wu, _Yongqiang_Lang, _Navid_Zargari, _Samir_Kour," Power Conversion and Control of Wind Energy Systems", IEEE Press Series on Power Engineering, John Wiley and SonsLtd.,2011.
2. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 3rd edition ,2009.

REFERENCES:

1. H. Siegfried and R. Waddington, "Grid integration of wind energy conversion systems" John Wiley and Sons Ltd.,2006.
2. G. N. Tiwari and M. K. Ghosal, "Renewable Energy Applications", Narosa Publications,2004.
3. J. A. Duffie and W. A. Beckman, "Solar Engineering of Thermal Processes", John Wiley & Sons,4th edition, 2013
4. G. M. Masters, "Renewable and Efficient Electric Power Systems", John Wiley and Sons, 2004.
5. G.D. Rai, "Non-conventional Energy Sources", Khanna Publishers

CO-PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2		2	2							3	
CO2	3	3	3	3	2		2	1							2	
CO3	2	2	2	2	2		2	1							2	
CO4	2	3	3	3	2		3	1							2	
CO5	2	2	3	3	2		3	1								

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEC16	L	T	P	SS	C
Course Name	ANALOG AND DIGITAL INTEGRATED CIRCUITS (Professional Elective -I)	3	0	0	0	3

COURSE OBJECTIVES :

1. VHDL fundamentals were discussed to modeling the digital system design blocks.
2. Design and implementation of combinational and sequential digital logic circuits.
3. Understand the basic concepts of operational amplifier and its various applications.
4. Explain the working and applications of multi vibrators using IC 555.
5. Know about various A/D and D/A convertors.

COURSE OUTCOMES :

After going through this course, the student will be able to

1. Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
2. Analyze and design basic digital circuits with combinational logic circuits using VHDL.
3. Analyze and design basic digital circuits with sequential logic circuits using VHDL.
4. Understand the IC 741 operational amplifier and its applications
5. Demonstrate different applications of 555 Timer and D-A, A-D Converters

UNIT-I : VHDL

Introduction to VHDL, Entity Declaration, Architecture, Data-Flow, Behavioral and Structural Style of Modelings, Data Types, Data Objects, Configuration Declaration, Package Declaration, Generic, Operators and Identifiers, PROCESS, IF, CASE and LOOP Statements, VHDL Libraries.

UNIT-II : COMBINATIONAL LOGIC DESIGN

Parallel Binary Adder, Carry Look Ahead Adder, BCD Adder, Multiplexers and Demultiplexers and their use in Combinational Logic Design, ALU, Digital Comparators, Parity Generators, Code Converters, Priority Encoders. (Qualitative approach of designing and modeling the mentioned combinational logic circuits with relevant digital ICs using HDL)

UNIT-III : SEQUENTIAL LOGIC DESIGN

Registers, Applications of Shift Registers, Ripple or Asynchronous Counters, Synchronous Counters, Synchronous and Asynchronous Sequential Circuits, Hazards in Sequential Circuits. (Qualitative approach of designing and modeling the mentioned sequential logic circuits with relevant digital ICs using HDL)

UNIT-IV

Introduction to Op-Amp: Block Diagram, Symbolic Representation, Characteristics, Ideal and Practical Specifications. **Op-Amp Applications:** Inverting and Non-inverting Amplifier, Differentiator and Integrator, Summing Amplifier, Instrumentation Amplifier, V-I and I-V Converter. **Active Filters:** Low Pass, High Pass, Band Pass and Band Stop Filters and their design guidelines.

UNIT-V

555 Timer: Functional Diagram, Monostable and Astable Operations and Applications.

D-A and A-D Converters: Weighted Resistor, R-2R Ladder and Inverted R-2R DAC's, Parallel Comparator Type, Counter Type, Successive Approximation and Dual Slope ADC's.

TEXT BOOKS

1. R.P.Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill Education Pvt. Ltd., 2010.
2. D. Roy Choudhury, "Linear Integrated Circuits", 2nd Edition, New Age International (P) Ltd 2003.

REFERENCES

1. John F. Wakerly, "Digital Design: Principles and Practices", 3rdEdition, PHI/Pearson Education.
2. J.Bhasker, "VHDL Primer", 3rd Edition, Pearson Education/PHI.
3. David A Bell, "Operational Amplifiers and Linear ICs", 3rd Edition, Oxford University Press.

Contribution of Course Outcomes (CO's) towards the achievement of Programme Outcomes (PO's)

(Strong – 3, Moderate – 2, Weak – 1)

CO –PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	2	-	2	-	-	-	-	-	-	2				
CO2	2	2	3	2	2	-	-	-	-	-	-	2				
CO3	2	2	3	2	2	-	-	-	-	-	-	2				
CO4	3	2	3	2	-	-	-	-	-	-	-	1				
CO5	3	2	3	2	-	-	-	-	-	-	-	1				

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEC10	L	T	P	SS	C
Course Name	ANALOG COMMUNICATIONS (Professional Elective -I)	3	0	0	0	3

COURSE OBJECTIVES:

Students undergoing this course are expected to

1. Familiarize with the fundamentals of analog communication systems.
2. Familiarize with various techniques for amplitude modulation and demodulation of signals.
3. Familiarize with various techniques for angle modulation and demodulation of signals
4. Develop the ability to classify and understand various functional blocks of radio transmitters and receivers.
5. Distinguish the figure of merits of various analog modulation methods.
6. Familiarize with basic techniques for generating and demodulating various pulse modulated signals.

COURSE OUTCOMES:

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

1. Acquired knowledge on Analog communication system and elements
2. Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
3. Differentiate various Angle modulation and demodulation schemes and their spectral characteristics
4. Analyze various functional blocks of radio transmitters and receivers
5. Analyze noise characteristics of various analog modulation methods and design simple analog systems for various modulation techniques

UNIT – I

AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, power relations in AM waves, Generation of AMwaves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT – II

DSB & SSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Comparison of AM Techniques, Applications of different AM Systems

UNIT – III

ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average

Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct & Indirect FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

UNIT – IV

TRANSMITTERS & RECEIVERS:

Radio Transmitter – Classification of Transmitter, Low level and High level AM Transmitters, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

Radio Receiver – Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, Frequency changing and tracking, Intermediate frequency, Image Frequency, AGC, FM Receiver.

UNIT – V

NOISE: Noise in Analog communication System, Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation System, Pre-emphasis & de-emphasis.

TEXT BOOKS:

1. Principles of Communication Systems-Simon Haykin, John Wiley, 2nd Edition, 2007.
2. Modern Digital and Analog Communication Systems –B.P.Lathi, Zhi Ding, Hari Mohan Gupta, Oxford University Press, 4thEdition, 2017

REFERENCES:

1. Electronics & Communication System– George Kennedyand Bernard Davis, TMH 2004.
2. Principles of Communication Systems–HTaub&D.Schilling, GautamSahe, TMH, 3rd Edition, 2007.
3. Communication Systems–R.P.Singh, SP Sapre, Second Edition TMH, 2007.
4. Electronic Communication systems–Tomasi, Pearson, fourth Edition, 2007.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) and Programme Specific Outcomes (PSO's)
(Strong – 3, Moderate – 2, Weak – 1)

CO – PO and PSO MAPPINGS

Mapping Course Outcomes with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3	-	2	2	-	-	-	2	-	-	-	2
CO2	3	3	2	2	3	-	-	2	-	-	-	2	-	-	-	1
CO3	2	2	1	2	3	-	2	-	-	-	-	1	-	-	-	2
CO4	2	3	1	2	1	3	2	-	-	-	-	1	-	-	-	2
CO5	2	2	2	3	2	3	-	3	-	3	-	2	-	-	-	1

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEC07	L	T	P	SS	C
Course Name	SIGNALS & SYSTEMS (Professional Elective -I)	3	0	0	0	3

COURSE OBJECTIVES:

This course will enable the students to

1. Study about basics of signals and systems.
2. Analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
3. Understand the characteristics of systems.
4. Introduce the concept of Laplace Transforms and Sampling process.
5. know transform technique to analyze the discrete time signals and systems.

COURSE OUTCOMES:

After completion of this course, the students will be able to

1. Differentiate the various classifications of signals and systems.
2. Analyze the frequency domain representation of signals using Fourier concepts.
3. Classify the systems based on their properties and determine the response of LTI Systems.
4. Know the sampling process, various types of sampling techniques and Laplace Transforms.
5. Apply Z-Transforms to analyze discrete time signals and Systems.

UNIT- I:

BASICS OF SIGNALS AND SYSTEMS

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Basic Operations on signals. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function, signum function and ramp function. 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.

UNIT -II:

FOURIER SERIES AND FOURIER TRANSFORM

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Introduction to Hilbert Transform.

UNIT –III:

ANALYSIS OF LINEAR SYSTEMS

Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV)system, Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time

CONVOLUTION AND CORRELATION

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Auto-correlation and cross-correlation of functions, properties of correlation function, Relation between Convolution and correlation.

UNIT- IV:

LAPLACE TRANSFORMS

Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal.

SAMPLING THEOREM

Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling.

UNIT -V:

Z–TRANSFORMS

Concept of Z-Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z transforms.

TEXT BOOKS:

1. Signals, Systems & Communications-B.P.Lathi, BS Publications, 2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2ndEdn, 1997.
3. Signals & Systems-Simon Haykin and Van Veen, Wiley, 2ndEdition, 2007.

REFERENCE BOOKS:

1. Linear Systems and Signals–BPLathi, OxfordUniversityPress,2015.
2. Signals and Systems–TK Rawat, Oxford University press,2011.
3. Signals and Systems-H P HSU,Second Edition, Schaum's OUTlines.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	1	-	-	-	-	-	-	-	1	2	-	-	-
CO2	3	3	1	1	-	-	-	-	-	-	-	1	2	-	-	13
CO3	2	2	1	1	-	-	-	-	-	-	-	1	2	-	-	-
CO4	3	3	1	1	-	-	-	-	-	-	-	1	2	-	-	-
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	-	-	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE25	L	T	P	SS	C
Course Name	ELECTRICAL MEASUREMENTS AND INSRUMENTATION LABORATORY	0	0	3	0	1.5

COURSE OBJECTIVES:

1. To understand students how different types of meters work and their construction.
2. To make the students understand how to measure resistance, inductance and capacitance by AC & DC bridges.
3. To understand the testing of CT and PT.
4. To Understand and the characteristics of Thermo couples, LVDT, Capacitive transducer, piezoelectric transducer.
5. To understand the measurement of strain and choke coil parameters.
6. To study the procedure for standardization and calibration of various methods.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Know about the phantom loading.
2. Learn the calibration process.
3. Measure the electrical parameters voltage - current - power - energy and electrical characteristics
4. of resistance - inductance and capacitance.
5. Gain the skill knowledge of various brides and their applications.
6. Learn the usage of CT's - PT's for measurement purpose.
7. Know the characteristics of transducers.
8. Measure the strains - frequency and phase difference.

Any 10 of the following experiments are to be conducted

1. Calibration of dynamometer wattmeter using phantom loading
2. Measurement of resistance using Kelvin's double Bridge and Determination of its tolerance. Measurement of Capacitance using Schering Bridge.
3. Measurement of Inductance using Anderson Bridge.
4. Calibration of LPF Wattmeter by direct loading.
5. Measurement of 3 phase reactive power using single wattmeter method for a balanced load.
6. Measurement of 3 phase active power using two wattmeter method.

7. Testing of C.T. using mutual inductor – Measurement of % ratio error and phase angle of given C.T. by Null deflection method.
8. P.T. testing by comparison – V.G as Null detector – Measurement of % ratio error and phase angle of the given P.T.
9. Determination of the characteristics of a Thermocouple.
10. Determination of the characteristics of a LVDT.
11. Determination of the characteristics for a capacitive transducer.
12. Measurement of strain for a bridge strain gauge.
13. Measurement of Choke coil parameters and single-phase power using three voltmeter and three ammeter methods.
14. Calibration of single-phase Energy Meter.
15. Dielectric oil Test using HV Kit.
16. Calibration of DC ammeter and voltmeter using Crompton DC Potentiometer.
17. AC Potentiometer: Polar Form / Cartesian Form - Calibration of AC voltmeter - Parameters of choke.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	-	-	-	-	-	3	-	-	2	1	1	1	-
CO2	1	1	2	-	-	-	-	-	3	-	-	2	1	1	1	-
CO3	1	1	3	-	-	-	-	-	3	-	-	2	1	1	-	-
CO4	1	1	2	-	-	-	-	-	3	-	-	2	1	1	-	-
CO5	1	1	-	-	-	-	-	-	3	-	-	2	1	1	1	-
CO6	2	1	2	-	-	-	-	-	3	-	-	2	1	1	1	-
CO7	2	1		-	-	-	-	-	3	-	-	2	1	1	1	-
CO8	1	1	3	-	-	-	-	-	3	-	-	2	1	1	-	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – I Semester					
Course Code	22UEE26	L	T	P	SS	C
Course Name	POWER ELECTRONICS LABORATORY	0	0	3	0	1.5

COURSE OBJECTIVES:

1. To learn the characteristics of various power electronic devices and analyze firing circuits and
2. commutation circuits of SCR.
3. To analyze the performance of single–phase and three–phase full–wave bridge converters with
4. both resistive and inductive loads.
5. To understand the operation of AC voltage regulator with resistive and inductive loads.
6. To understand the working of Buck converter and Boost converter.
7. To understand the working of single-phase & three-phase inverters.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Analyse characteristics of various power electronic devices and design firing circuits for SCR.
2. Analyse the performance of single–phase dual, three–phase full–wave bridge converters and dual converter with both resistive and inductive loads.
3. Examine the operation of Single-phase AC voltage regulator and Cycloconverter with resistive and inductive loads.
4. Differentiate the working and control of Buck converter and Boost converter.
5. Differentiate the working & control of Square wave inverter and PWM inverter.

Any 10 of the Following Experiments are to be conducted

1. Characteristics of SCR - Power MOSFET & Power IGBT.
2. R - RC & UJT firing circuits for SCR.
3. Single -Phase semi-converter with R & RL loads.
4. Single -Phase full-converter with R & RL loads.
5. Three- Phase full-converter with R & RL loads.
6. Single-phase dual converter in circulating current & non-circulating current mode of operation.
7. Single -Phase square wave bridge inverter with R & RL Loads.
8. Three-phase bridge inverter with 120 and 180-degree conduction mode
9. SPWM control of Three-phase bridge inverter
10. Single - Phase PWM inverter.
11. Boost converter in Continuous Conduction Mode operation.
12. Buck converter in Continuous Conduction Mode operation.
13. Single-Phase AC Voltage Regulator with R & RL Loads.
14. Single-phase step down Cycloconverter with R & RL Loads.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

CO-PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**2**	**2**	**2**						**3**			**2**	**2**	**2**		
CO2	**2**	**2**	**1**						**3**			**2**	**2**	**2**		
CO3	**2**	**2**	**1**						**3**			**2**	**2**	**2**		
CO4	**2**	**2**	**1**						**3**			**2**	**2**	**2**		
CO5	**2**	**2**	**1**						**3**			**2**	**2**	**2**		

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	**III Year – I Semester**					
Course Code	**22UEN11**	**L**	**T**	**P**	**SS**	**C**
Course Name	**ADVANCED ENGLISH COMMUNICATION SKILLS LAB (Skill Course)**	**2**	**0**	**2**	**2**	**2**

PREAMBLE

A course on Advanced English Communication Skills (AECS) Lab is considered essential at the third-year level of B.Tech. At this stage, the students need to prepare themselves for their career which requires them to listen to, read, speak and write in English both for their professional and interpersonal communication. The main purpose of this course is to prepare the students of Engineering for their placements.

COURSE OBJECTIVES: This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve students' fluency in spoken English
- To enable them to listen to English spoken at normal conversational speed
- To help students develop their vocabulary
- To read and comprehend texts in different contexts
- To communicate their ideas relevantly and coherently in writing
- To make students industry-ready
- To help students acquire behavioral skills for their personal and professional life
- To respond appropriately in different socio-cultural and professional contexts

LEARNING OUTCOMES: Students will be able to:

- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects Communicate confidently in formal and informal contexts

SYLLABUS

The following course activities will be conducted as part of the Advanced English Communication Skills (AECS) Lab:

1. **Inter-personal Communication and Vocabulary Building** - Starting a Conversation – Responding Appropriately and Relevantly – Role Play in Different Situations - Synonyms and Antonyms, One- word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.
2. **Reading Comprehension and Listening Skills** –General Vs Local Comprehension, Techniques- Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning-Listening Comprehension (Video/Audio talks)
3. **Technical Writing Skills and verbal ability** – Structure and Presentation of Different Types of Writing
   – Letter Writing/Resume Writing/ e-correspondence/ Tenses – Contextual vocabulary- Correction of sentences, Analogies, Spotting Errors and Sentence Completion,

4. **Presentation Skills** –
   Public speaking-Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ e-mails/Assignments… etc.
5. **Getting Ready for the Job:**
   Group Discussion and Interview Skills – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

Minimum Hardware Requirement:

Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 30 students in the lab:

- **Spacious room with appropriate acoustics**
- **Eight round tables with five movable chairs for each table.**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **Computer with suitable configuration**

Suggested Software: The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass**, 10^{th} Edition.
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, CRACKING GRE by CLIFFS)**
- **TRAIN2SUCCESS.COM**

Suggested Reading:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press2009.
2. Technical Communication by Paul V.Anderson.2007. Cengage Learning pvt. Ltd. NewDelhi.
3. Business and Professional Communication: Keys for Workplace Excellence .Kelly M. Quintanilla& ShawnT.Wahl. SageSouth AsiaEdition. SagePublications.2011.
4. The Basics of Communication: A Relational Perspective. Steve Duck & David T.McMahan. Sage South AsiaEdition.SagePublications.2012.
5. English Vocabulary in Use series, CambridgeUniversityPress2008.
6. Management Shapers Series by Universities Press (lndia) Pvt Ltd., Himayatnagar, Hyderabad2008.
7. Handbook for Technical Communication by David A.McMurrey & Joanne Buckley.2012.

8. Handbook for Technical Writing by David A McMurrey & JoanneBuckely CENGAGE Learning 2008.
9. Job Hunting by Colm Downes, Cambridge University Press2008.
10. Master Public Speaking by Anne Nicholls, JAICOPublishingHouse,2006.
11. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.
12. Books on TOEFL/GRE/GMAT/CAT/IELTS/SAT by Barron's/DELTA/Cambridge University Press.
13. The Definitive Book of body Language – by Allan Pease, Barbara Pease.

Sample Web references:

Listening

- https://learningenglish.voanews.com/z/3613
- http://www.englishmedialab.com/listening.html

Speaking

- https://www.talkenglish.com/
- BBC Learning English – Pronunciation tips
- Merriam-Webster – Perfect pronunciation Exercises

All Skills

- https://www.englishclub.com/
- http://www.world-english.org/
- http://learnenglish.britishcouncil.org/

Online Dictionaries

- Cambridge dictionary online
- MacMillan dictionary
- Oxford learner's dictionaries

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

CO-PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1																
CO2																
CO3																
CO4																

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE27	L	T	P	SS	C
Course Name	SWITCHGEAR AND PROTECTION	3	0	0	0	3

COURSE OBJECTIVES:

1. To provide the basic principles and operation of various types of circuit breakers.
2. To know the classification, operation and application of different types of electromagnetic protective relays.
3. To explain protective schemes for generator and transformers.
4. To gain the knowledge of various protective schemes used for feeders and bus bars.
5. To explain the principle and operation of different types of static relays.
6. To understand different types of over voltages in a power system and principles of different neutral grounding methods.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Illustrate the principles of arc interruption for application to high voltage circuit breakers of air - oil - vacuum - SF6 gas type.
2. Analyse the working principle and operation of different types of electromagnetic protective relays.
3. Acquire knowledge of protective schemes for generator and transformers for different fault conditions.
4. Classify various types of protective schemes used for feeders and bus bar protection and Types of static relays.
5. Analyse the operation of different types of over voltages protective schemes required for insulation co–ordination and types of neutral grounding.

UNIT–I

Circuit Breakers: Application oriented evolution of Switchgear - Miniature Circuit Breaker (MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon – RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Concept of oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– Circuit Breaker ratings and specifications– Concept of Auto reclosing – Numerical examples

UNIT–II

Electromagnetic Protection: Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types– Applications of relays: Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

UNIT–III

Generator Protection: Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

Transformer Protection: Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

UNIT–IV

Feeder and Bus bar Protection & Static Relays: Over current Protection schemes – PSM - TMS – Numerical examples – Carrier current and three zone distance relay using impedance relays. Protection of bus bars by using Differential protection. Static relays: Introduction – Classification of Static Relays – Basic Components of Static Relays.

UNIT–V

Protection against over voltage and grounding: Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc oxide lighting arresters. Grounded and ungrounded neutral systems – Effects of ungrounded neutral on system performance – Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

TEXT BOOKS:

1. Power System Protection and Switchgear by Badri Ram and D.N Viswakarma - Tata McGraw Hill Publications - 2 nd edition - 2011.
2. Power system protection- Static Relays with microprocessor applications by T.S.Madhava Rao - Tata McGraw Hill - 2 nd edition.

REFERENCE BOOKS:

1. Fundamentals of Power System Protection by Paithankar and S.R.Bhide. - PHI - 2003.
2. Art & Science of Protective Relaying – by C R Mason - Wiley Eastern Ltd.
3. Protection and SwitchGear by BhaveshBhalja - R.P. Maheshwari - Nilesh G.Chothani - Oxford University Press - 2013

CO – PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	-	-	-	-	-	-	-	1	2	-	2	-
CO2	3	3	3	2	-	-	-	-	-	-	-	1	2	-	2	-
CO3	1	3	3	1	1	-	-	-	-	-	-	1	2	-	2	-
CO4	3	3	2	1	1	-	-	-	-	-	-	1	2	-	2	-
CO5	2	2	2	1	1	-	-	-	-	-	-	1	2	-	2	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE28	L	T	P	SS	C
Course Name	Electric Drives	3	0	0	0	3

COURSE OBJECTIVES:

1. To learn the fundamentals of electric drive and different electric braking methods.
2. To analyze the operation of three phase converter-controlled dc motors and four quadrant operation of dc motors using dual converters.
3. To discuss the DC-DC converter control of dc motors.
4. To understand the concept of speed control of induction motor by using AC voltage controllers, voltage source inverters and slip power recovery scheme.
5. To learn the speed control mechanism of synchronous motors.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Explain the fundamentals of electric drive and different electric braking methods.
2. Analyze the operation of three-phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
3. Describe the DC-DC converter fed control of dc motors in various quadrants of operation
4. Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters and differentiate the stator side control and rotor side control
5. Learn the concepts of speed control of synchronous motor with different methods.

UNIT - I

Fundamentals of Electric Drives: Electric drive and its components– Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.

UNIT - II

Controlled Converter Fed DC Motor Drives: 3-phase half and fully-controlled converter fed separately and self-excited DC motor drive – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Dual converter fed DC motor drives -Numerical problems.

UNIT - III

DC–DC Converters Fed DC Motor Drives: Single quadrant, two quadrant and four quadrant DC-DC converter fed separately excited and self-excited DC motors – Continuous current mode of operation - Output voltage and current waveforms – Speed– torque expressions and characteristics – Closed loop operation (qualitative treatment only).

UNIT – IV

Stator and Rotor side control of 3-phase Induction motor Drive: Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by PWM voltage source inverter – Closed loop V/f control of

induction motor drives (qualitative treatment only). Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics.

UNIT – V

Control of Synchronous Motor Drives: Separate control of synchronous motor – self-control of synchronous motor employing load commutated thyristor inverter - closed loop control of synchronous motor drive (qualitative treatment only)– PMSM (Basic operation only).

TEXT BOOKS:

1. Fundamentals of Electric Drives – by G K Dubey - Narosa Publications - 2 nd edition – 2002.
2. Power Semiconductor Drives - by S.B.Dewan - G.R.Slemon - A.Straughen - Wiley India - 1984.

REFERENCE BOOKS:

1. Electric Motors and Drives Fundamentals - Types and Apllications - by Austin Hughes and Bill Drury - Newnes.4th edition - 2013.
2. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications - 1987. 3. Power Electronic Circuits - Devices and applications by M.H.Rashid - PHI - 3 rd edition - 2009

CO – PO MAPPING:

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	2	1	-	-	-	-	-	2	2	2	-	-
CO2	3	3	2	3	2	2	-	1	-	-	-	2	2	2	-	-
CO3	3	3	2	3	2	1	-	-	-	-	-	2	2	2	-	-
CO4	3	3	2	3	2	1	-	1	-	-	3	2	2	2	-	-
CO5	3	3	2	2	2	1	-	-	-	-	-	1	2	2	-	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEC41	L	T	P	SS	C
Course Name	MICROPROCESSORS & MICROCONTROLLERS	3	0	0	0	3

COURSE OBJECTIVES:

- To acquire knowledge on microprocessors and microcontrollers.
- To select processors based on requirements.
- To acquire the knowledge on interfacing various peripherals, configure and develop programs to interface peripherals/sensors.
- To develop programs efficiently on ARM Cortex processors and debug.

COURSE OUTCOMES:

After going through this course the student will be able to

CO1: Understand the architecture of microprocessor and their operation

CO2: Demonstrate programming skills in assembly language programming

CO3: Do interfacing design of peripherals like I/O, A/D, D/A, timer, etc

CO4: Develop systems using different microcontrollers

CO5: Design ARM microcontroller based systems

UNIT-I

Introduction to Microprocessors: Basic Microprocessor Architecture, Overview of 8085, Architecture, Pin Diagram, Memory Organization, Interrupts.

8086 Architecture: Main Features, Pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II

8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacingseven segment displays, Intel 8251 USART Architecture and Interfacing, Intel 8257 DMA Controller, Stepper Motor, A/D and D/A Converters, Need for 8259 ProgrammableInterrupt Controllers.

UNIT-IV

Intel 8051 Microcontroller: Difference between Microprocessor and Microcontroller, Architecture, I/O Ports,external memory, counters/timers, serial data input/output, interrupts.

Assembly language programming: Instructions, addressing modes, simple programs.

Interfacing to 8051: A/D and D/A Convertors, Stepper motor interface, keyboard, LCD Interfacing, Traffic light controls.

UNIT-V

ARM Architectures and Processors: ARM Architecture, ARM Processors Families, ARM Cortex-A Class Processor, ARM Cortex-M0 Processor, ARM Cortex-M3 Processor.

TEXT BOOKS

1. Ramesh S. Goankar, "Microprocessor Architecture, Programming and Applications with 8085", 5th Edition, Prentice Hall
2. A.K Ray, K.M.Bhurchandhi, "Advanced Microprocessor and Peripherals", Tata McGraw Hill Publications, 2000.
3. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, "The 8051 Microcontrollers and Embedded Systems using Assembly and C", 2nd Edition, Pearson, 2011.
4. The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors by Joseph You.

REFERENCES

1. Dr. Alexander G. Dean, "Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach", ARM Education Media, 2017.
2. Douglas V Hall, SSSP Rao, "Microprocessors and Interfacing: Programming and Hardware", by 3rdEdition, Tata McGraw Hill Education Pvt. Ltd., 1994.
3. Cortex-M3 Technical Reference Manual.

Contribution of Course Outcomes (CO's) towards the achievement of ProgrammeOutcomes (PO's) and Programme Specific Outcomes (PSO's)
(Strong – 3, Moderate – 2, Weak – 1)

CO –PO and PSO MAPPINGS

	PO 1	PO 2	PO	PO 4	PO 5	PO6	PO	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	2	1	2	1	1	1	-	-	-	-	-	3	-	1	-
CO2	2	2	2	3	2	2	2	-	-	-	-	-	3	2	2	-
CO3	3	1	3	2	2	2	2	-	-	-	-	-	3	2	3	-
CO4	2	2	2	1	2	2	2	-	-	-	-	-	3	2	3	-
CO5	2	2	3	3	2	2	2	-	-	-	-	-	3	2	3	-

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE31	L	T	P	SS	C
Course Name	**Battery Management Systems and Charging Stations** (Open Elective-II)	3	0	0	0	0

COURSE OBJECTIVES:

1. Able to understand the working of different batteries for EV applications
2. Able to know the fundamentals of battery charging methods and their advantages
3. Able to know the different kinds of equipment in charging station
4. Able to know the requirements of battery management.
5. Able to know method of modelling batteries and their simulation studies.

COURSE OUTCOMES:

After the completion of the course the student should be able to:

1. Describe the construction and operation of different batteries for EV applications
2. Describe charging algorithms of different batteries and balancing methods of battery packs Describe the different kinds of infrastructure needed in the charging stations
3. Describe the requirements of battery management and their maintenance.
4. Obtain the modelling of batteries and develop their simulation models.

UNIT - I

EV Batteries Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel. Lead Acid Batteries: Lead acid battery basics, special characteristics of lead acid batteries, battery life and maintenance, Li-ion batteries. Nickel-based Batteries: Nickel cadmium, Nickel metal hydride batteries. Sodium-Based Batteries: Introduction, sodium sulphur batteries, sodium metal chloride (Zebra) batteries. Lithium Batteries: Introduction, the lithium polymer battery, lithium ion battery.

UNIT – II

Battery charging strategies Charging algorithms for a single battery: Basic terms for charging performance evaluation and characterization, CC charging for NiCd/NiMH batteries, CV charging for lead acid batteries, CC/CV charging for lead acid and Li-ion batteries, MSCC charging for lead acid, NiMH and Li-ion batteries, TSCC/CV charging for Li-ion batteries, CVCC/CV charging for Li-ion batteries, Pulse charging for lead acid, NiCd/NiMH and Li-ion batteries, Charging termination techniques, Comparisons of charging algorithms and new development; Balancing methods for battery pack charging: Battery sorting Overcharge for balancing, Passive balancing, Active balancing.

UNIT -III

Charging Infrastructure Domestic Charging Infrastructure, Public charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.

UNIT – IV

Battery-Management-System Requirements Battery-pack topology, BMS design requirements, Voltage sense, Temperature sense, Current sense, Contactor control, Isolation sense, Thermal control, Protection, Charger control, Communication via CAN bus, Log book, SOC estimation, Energy estimation, Power estimation, Diagnostics.

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT - V

Battery Modelling General approach to modelling batteries, simulation model of rechargeable Li-ion battery, simulation model of a rechargeable NiCd battery, Parameterization of NiCd battery model, Simulation examples. R-20 Syllabus for EEE-JNTUK w.e.f. 2020 –21 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA KAKINADA–533003, Andhra Pradesh, India DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

TEXT BOOKS

1. Electric Vehicles Technology Explained by James Larminie Oxford Brookes University, Oxford, UK John Lowry Acenti Designs Ltd., Uk. (Unit-1)
2. Energy Systems for Electric and Hybrid Vehicles by K.T. Chau, IET Publications, First edition, 2016. (Unit-2)

REFERENCE BOOKS:

1. Modern Electric Vehicles Technology by C.C.Chan, K.T Chau, Oxford University Press Inc., New york , 2001. (Unit-3)
2. Battery Management Systems Vol. – II Equivalent Circuits and Methods, by Gregory L.Plett, Artech House publisher, First edition 2016. (Unit-4)
3. Battery Management Systems: design by Modelling by Henk Jan Bergveld, Wanda S. Kruijt, Springer Science & Business Media, 2002. (Unit-5)

Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	-	-	-	-	-	-	-	-	2	-	-	-	1
CO2	3	1	2	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	2	-	-	-	3
CO5	3	3	2	-	3	-	-	-	-	-	-	2	-	-	-	2

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE32	L	T	P	SS	C
Course Name	Electrical Safety (Open Elective -II)	3	0	0	0	3

COURSE OBJECTIVES

1. Able to understand the working of different batteries for EV applications
2. Able to know the fundamentals of battery charging methods and their advantages
3. Able to know the different kinds of equipment in charging station
4. Able to know the requirements of battery management.
5. Able to know method of modelling batteries and their simulation studies.

COURSE OUTCOMES

Upon successful completion of the course, the student must be able to

1. Outline the possibilities of getting electrical shock and its severity and safety precautions to be taken (L2).
2. Understand the Indian power sector organization and Electricity rules, electrical safety in residential, commercial, agriculture and dos and don'ts with electrical appliances (L2)
3. Able to analyse the safety during different stages of equipment in plant and its risk, and prepare safety documentation and clearance notice (L4).
4. Identify hazardous areas and classify various types of equipment enclosures (L4).
5. Distinguish various fire extinguishers and their classification(L4)

UNIT -I

Introduction to Electrical Safety, Shocks and Their Prevention: Terms and definitions, objectives of safety and security measures, Hazards associated with electric current and voltage, who is exposed, principles of electrical safety, approaches to prevent Accidents, scope of subject electrical safety. Primary and secondary electrical shocks, possibilities of getting electrical shock and its severity, medical analysis of electric shocks and its effects, shocks due to flash/ Spark over's, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, residential buildings and shop

UNIT -II

Electrical Safety in Residential, Commercial and Agricultural Installations: Wiring and fitting – Domestic appliances –water tap giving shock –shock from wet wall –fan firing shock –multi-storied building –Temporary installations – Agricultural pump installation –Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT -III

Electrical Safety during Installation, Testing and Commissioning, Operation and Maintenance: Preliminary preparations –safe sequence –risk of plant and equipment –safety documentation –field quality and safety -personal protective equipment –safety clearance notice –safety precautions – safeguards for operators –safety

UNIT -IV

Electrical Safety in Hazardous Areas: Hazardous zones –class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipment's for hazardous

locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT -V

Fire Extinguishers: Fundamentals of fire-initiation of fires, types; extinguishing techniques, prevention of fire, types of fire extinguishers, fire detection and alarm system; CO2and Halogen gas schemes; foam schemes.

TEXT BOOKS:

1. Rao, S. and Saluja, H.L., "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, 1988.

REFERENCE BOOKS:

1. Cooper.W.F, "Electrical safety Engineering", Newnes-Butterworth Company, 1978.
2. John Codick, "Electrical safety hand book", McGraw Hill Inc., New Delhi, 2000.
3. Nagrath, I.J. and Kothari, D.P., "Power System Engineering", Tata McGraw Hill, 1998.
4. Wadhwa, C.L., "Electric Power Systems", New Age International, 2004.
5. Contribution of Course Outcomes (COs) towards the achievement of programme outcomes (POs) (Strong – 3, Moderate – 2, Weak – 1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1			3						2		1	1	2
CO2	3	2	2			3						2		1	2	3
CO3	3	2	1			3	2					2		2	2	2
CO4	2	3	1			3						2		1	1	3
CO5		2	2			3						2		1	1	3

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE30	L	T	P	SS	C
Course Name	**Fundamentals of utilization of Electrical Energy** (Open Elective-II)	3	0	0	0	0

Course Objectives:

1. To study the various types of Illumination equipment, measurement of Illumination, Illumination techniques.
2. To know the various technologies used for heating applications using electrical energy.
3. To understand the various welding techniques and operations of welding equipment and comparison.
4. To know the various systems of traction, equipment used for traction.
5. To understand the importance and operation of various Energy storage systems and comparison & applications.

Course Outcomes:

1. After the completion of the course the student should be able to
2. Know the concepts of illumination and various illumination methods.
3. Know about the resistance - induction and dielectric heating.
4. Learn about the resistance and arc welding and welding equipment
5. Know about the mechanisms - equipment and technology used in the electric traction. Differentiate the importance of various energy storage systems

UNIT - I

Illumination fundamentals Introduction - terms used in illumination–Laws of illumination–Lux meter–Sources of light. Various Illumination Methods Tungsten filament lamps and fluorescent lamps - Comparison –Basic principles of light control– Types and design of lighting and flood lighting–LED lighting - Energy conservation.

UNIT - II

Electric Heating Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.

UNIT - III

Electric Welding Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

UNIT - IV

Electric Traction System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves. Calculations of tractive effort– power Specific energy consumption for given run–Effect of varying acceleration and braking retardation Adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

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UNIT - V

Introduction to Energy Storage Systems Need for energy storage - Types of energy storage-Thermal - electrical - magnetic and chemical storage systems - Comparison of energy storage technologies-Applications.

Text Books:

1. Electrical Power Systems (Generation, Transmission, Distribution, Protecection and Utilization of Electrical Energy) – Dr. S.L.Uppal and Prof. Sunil S.Rao – Khanna Publisher, 15th edition, 1987.
2. Electric Power Distribution – A S Pabla – McGrawHill.

Reference Books:

1. Generation Distribution and Utilization of Electrical Energy – C.L.Wadhwa- New Age International Publishers- revised third edition.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	-	-	3	1	1	-	-	-	-	2	-	-	2	3
CO2	3	3	3	-	3	1	-	-	-	-	-	2	-	-	3	2
CO3	2	2	2	-	2		1	-	-	-	-	2	-	-	2	3
CO4	3	3	-	-	-	1	1	-	-	-	-	2	-	-	2	3
CO5	3	3	-	-	1	2	-	-	-	-	-	2	-	-	2	2

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEE33	L	T	P	SS	C
Course Name	Analog Control Systems (Professional Elective -II)	3	0	0	0	3

Course objectives:

This course introduces students to recently developed and advanced techniques for solving complex control problems. The course presents theory and methodology for analysis and modelling of systems and signals, and methods for design and synthesis of feedback controllers. The emphasis of this course will be on robust control and optimal control of dynamical systems.

Course Outcomes:

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

- Discuss state variable approach for linear time invariant systems in both the continuous and discrete time systems.
- Develop of state models for linear continuous–time and discrete–time systems.
- Apply vector and matrix algebra to find the solution of state equations for linear continuous–time and discrete–time systems.
- Define controllability and observability of a system and test for controllability and observability of a given system.
- Design pole assignment and state observer using state feedback.
- Develop the describing function for the nonlinearity present to assess the stability of the system , Lyapunov function for the stability analysis of nonlinear systems.

UNIT - I

State Variable Analysis and Design:

Introduction, Concept of State, State Variables and State Model, State Models for Linear Continuous–Time Systems, State Variables and Linear Discrete– Time Systems.

UNIT - II

State Variable Analysis and Design (continued):

Diagonalization, Solution of State Equations, Concepts of Controllability and Observability.

UNIT - III

Pole Placement Design and State Observers:

Introduction, Stability Improvements by State Feedback, Necessary and Sufficient Conditions for Arbitrary Pole Placement, State Regulator Design, Design of State Observer, Compensator Design by the Separation Principle.

UNIT - IV

Non-linear systems Analysis:

Introduction, Common Nonlinear System Behaviours, Common Nonlinearities in Control Systems, Fundamentals, Describing Functions of Common Nonlinearities, Stability Analysis by Describing

Function Method, Concept of Phase Plane Analysis, Construction of Phase Portraits, System Analysis on the Phase Plane.

UNIT - V

Non-linear systems Analysis (continued):

Simple Variable Structure Systems, Lyapunov Stability Definitions, Lyapunov Stability Theorems, Lyapunov Functions for Nonlinear Systems.

Text Book:

1 Control Systems Engineering (For the Modules1 and 2) I.J. Nagarathand M.Gopal NewAge 5th Edition,2007

2 Digital Control and State Variable Methods: Conventional and Intelligent Control Systems M.Gopal Mc

Reference Books:

Control Systems Engineering (For the GrawHill 3rd Edition,2008 3 Modern Control Theory R. V. Parvatikar Prism Books Pvt. Ltd. 1st Edition,2014

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	2	3	2		-	-	-	-	-	-	-	2	1	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-	1
CO4	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-	
CO5	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-	1
CO6	3	3	2	-	-	-	-	-	-	-	-	2	-	-	-	-

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEC17	L	T	P	SS	C
Course Name	Digital Signal Processing (Professional Elective -II)	3	0	0	0	3

Course Learning Objectives:

1. To study about discrete time systems
2. To learn about FFT algorithms.
3. To study the design techniques for IIR digital filters
4. To study the design techniques for FIR digital filters
5. To study the properties of Multirate digital signal processing and about QMF filters.

Course Outcomes:

After completion of this course, the students will be able to

1. Applythedifferenceequationsconceptintheanalysisof Discretetimesystems
2. Use the FFT algorithm for solving the DFT.
3. Design and Realize a Digital IIR filter from the given specifications
4. Design and Realize a Digital FIR filter from the given specifications
5. Use the Multirate Processing concepts in various applications (eg: Design of phase shifters, Interfacing of digital systems)

UNIT-I

INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals &sequences, Classification of Discrete time systems, stability of LTI systems, Invertability, Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems

UNIT-II

DISCRETE FOURIER SERIES &FOURIER TRANSFORMS: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Time Fourier transforms, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT)-Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT-III

DESIGNOFIIRDIGITALFILTERS&REALIZATIONS: Analog filter approximations Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

UNIT-IV

DESIGNOFFIRDIGITALFILTERS&REALIZATIONS:

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters, Basic structures of FIR systems

UNIT-V

MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Down Sampling, Decimation, Spectrum of Down Sampling, Up Sampling, Interpolation, Spectrum of Up Sampling, Cascading Sample Rate Converters, Sampling Rate Conversion, Applications of Multirate DSP, Filter Banks.

Textbooks:

1. Digital Signal Processing, Principles, Algorithms, and Applications: JohnG. Proakis, Dimitris G. Manolakis, Pearson Education/PHI,2007.
2. Discrete Time Signal Processing–A.V.Oppenheim and R.W. Schaffer,PHI

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA Mc GrawHill,2006
2. DSP Primer-C.Britton Rorabaugh, TataMcGrawHill,2005.
3. Digital signal processing: P. Ramesh babu, SCITECH Publications

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	-	-	-	-	-	-	-	1	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	1	-	-	-	2
CO3	3	3	3	1	2	-	-	-	-	-	-	2	-	-	-	-
CO4	3	3	3	1	2	-	-	-	-	-	-	2	-	-	-	2
CO5	3	3	3	1	2	-	-	-	-	-	-	2	-	-	-	-

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Year & Sem	III Year – II Semester					
Course Code	22UEC39	L	T	P	SS	C
Course Name	VLSI Design (Professional Elective -II)	3	0	0	0	3

Course Objectives :

1. Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
2. Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
3. Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.
4. Understand the concept of synthesis and different testing techniques.
5. Understand the FPGA Design process.

Course Outcomes:

After going through this course, the student will be able to

1. Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
2. Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
3. Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.
4. Able to identify different types of faults and suitable Testing technique.
5. Design various applications using FPGA.

UNIT-I:

Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. Ids versus Vds Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. NMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology.

UNIT-II

MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic DiagramsTranslation to Mask Form.

UNIT-III

Basic Circuit Concept: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

UNIT-IV

Introduction to Synthesis: Logic synthesis, RTL synthesis, High level Synthesis.

Design for Testability: Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self-Test techniques.

UNIT-V

FPGA Design: Complex Programmable Logic Devices (CPLDs), Basic FPGA Architecture, FPGA Configuration, Configuration Modes, FPGA Design Process- FPGA Design Flow, FPGA Families, FPGA Design Examples - Stack, Queue and Shift Register Implementation using VHDL, Step-by-step approach of FPGA design process on Xilinx environment.

INTRODUCTION TO ADVANCED TECHNOLOGIES: Giga-scale dilemma, Short channel effects, High–k, Metal Gate Technology, FinFET, TFET.

Text Books

1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.

2. CMOS Digital Integrated Circuits Analysis and Design- Sung-Mo Kang, Yusuf Leblebici, Tata McGrawHill Education, 2003.

References

1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education.

2. Integrated Nano electronics: Nanoscale CMOS, Post-CMOS and Allied Nanotechnologies Vinod Kumar Khanna, Springer India, 1st edition, 2016.

Contribution of Course Outcomes (CO's) towards the achievement of Programme Outcomes (PO's)

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	1	3	3	2	2	-	-	-	-	-	-	2	-	-	-	2
CO4	2	3	3	2	3	-	-	-	-	-	-	2	-	-	-	2
CO5	1	2	3	-	3	-	-	-	-	-	-	2	-	-	-	2

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEC45	L	T	P	SS	C
Course Name	Microprocessor & Microprocessors Laboratory	0	0	3	0	1.5

PART- A: (Minimum of 5 Experiments has to be performed) 8086 AssemblyLanguage Programming and Interfacing

1. Programs for 16 -bit arithmetic operations (using Various Addressing Modes).
    a. Addition and Subtraction operations
    b. Multiplication and Division operations.
2. Program for sorting an array.
3. Program for Factorial of given n-numbers.
4. DOS/BIOS Programmimg:Display String With & Without Echo
5. Interfacing DAC to8086.
6. Interfacing stepper motor to8086.

PART-B: (Minimum of 5 Experiments has to be performed) 8051 AssemblyLanguage Programming and Interfacing

1. Finding number of 1's and number of 0's in a given 8-bit number
2. Average of n-numbers.
3. Program and verify Timer/ Counter in8051.
4. Interfacing Traffic Light Controller to8051.
5. UART operation in8051
6. Interfacing LCD to8051.

PART-C (Minimum of 2 Experiments has to be performed) Conduct the following experiments using ARM CORTEX M3 PROCESSOR USING KEILMDK ARM

1. Write an assembly program to multiply of 2 16-bit binary numbers.
2. Write an assembly program to find the sum of first 10 integers numbers.
3. Write a program to toggle LED every second using timer interrupt.

Equipment Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. 8086 Microprocessor kits
4. 8051 microcontroller kits
5. ADC module, DAC module
6. Stepper motor module
7. Key board module
8. Digital Multi-meters
9. ROM/RAM Interface module
10. Bread Board etc.
11. ARM CORTEX M3

12. KEIL MDKARM, Digital Multi-meters

References:

1. A.K Ray, K.M.Bhurchandhi, "Advanced Microprocessor and Peripherals", Tata McGraw Hill Publications, 2000.
2. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, "The 8051 Microcontrollers and Embedded Systems using Assembly and C", 2nd Edition, Pearson, 2011.

Course Learning Objectives:

To develop & execute variety of assembly language programs of Intel 8086 including arithmetic, Sorting, factorial programming

3. To learn about interfacing Intel 8086 with peripherals
4. To develop & execute simple programs on 8051 Microcontroller
5. To develop programming on ARM based CortexM3 Processsor

Course outcomes:

After the completion of the Course student is able to

1. Carry out basic arithmetic & Logical calculations on 8086 processor
2. Apply the concepts in the design of Micrprocessor based system
3. Design and implement 8051 Microcontroller based system
4. Develop and implement the program written in ARM CortexM3 language

CO-PO-PSO MAPPING

CO.No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	-	2	-	-	2
CO2	2	1	1	-	-	-	-	-	-	-	-	2	-	-	2
CO3	2	2	2	-	-	-	-	-	-	-	-	2	-	-	2
CO4	2	1	1	-	-	-	-	-	-	-	-	2	-	-	2

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Year & Sem	III Year – II Semester					
Course Code	22UEE35	L	T	P	SS	C
Course Name	POWER SYSTEM AND SIMULATION LAB	0	0	3	0	1.5

Course Objectives:

To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

Course Outcomes:

After the completion of the course the student should be able to:

1. Estimate the sequence impedances of 3-phase Transformer and Alternators
2. Evaluate the performance of transmission lines
3. Analyse and simulate power flow methods in power systems
4. Analyse and simulate the performance of PI controller for load frequency control.
5. Analyse and simulate stability studies of power systems

Any of 5 experiments are to be conducted from each section:

Section I: **Power Systems Lab:**

1. Estimation of sequence impedances of 3-phase Transformer
2. Estimation of sequence impedances of 3-phase Alternator by Fault Analysis
3. Estimation of sequence impedances of 3-phase Alternator by Direct method
4. Estimation of ABCD parameters on transmission line model
5. Performance of long transmission line without compensation
6. Performance of long transmission line with shunt compensation
7. Analyze the Ferranti effect on long transmission line

Section II: **Simulation Lab**

1. Determination of Ybus using direct inspection method
2. Load flow solution of a power system network using Gauss-Seidel method
3. Load flow solution of a power system network using Newton Raphson method.
4. Formation of Zbus by building algorithm.
5. Economic load dispatch with & without losses
6. Load frequency control of a two area Power System without & with PI controller
7. Transient Stability analysis of single machine connected to an infinite bus (SMIB) using equal area criterion.

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Contribution of Course Outcomes (CO's) towards the achievement of Programme Outcomes (PO's)

(Strong – 3, Moderate – 2, Weak – 1)

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	-	-	-	3	-	-	-	-	2	2	-	2	-
CO2	2	1	2	-	-	-	3	-	-	-	-	2	1	-	2	-
CO3	2	2	2	-	-	-	3	-	-	-	-	2	2	-	2	-
CO4	3	1	2	-	-	-	3	-	-	-	-	2	1	-	2	-

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	III Year – II Semester					
Course Code	**22UEC48**	**L**	**T**	**P**	**SS**	**C**
Course Name	**IOT AND APPLICATIONS LAB**	**0**	**0**	**3**	**0**	**1.5**

Course Objectives:

- To learn and understand elements of IoT system.
- Acquire knowledge about various protocols of IoT.
- To learn and understand design principles and capabilities of IoT.

Course Outcomes (COs):

After going through this course the student will be able to

CO1: Describe internet of Things and challenges posed by IoT networks leading to new models.

CO2: Understand internet of Things and its hardware and software components.

CO3: Remotely monitor data and control devices.

CO4: Learn IoT related protocols and specifications.

CO5: Design real time IoT based applications

List of Experiments:

1. Introduction to Raspberry Pi Board/ Arduino/NodeMCU
2. To interface rain drop and soil moisture sensors with Arduino.
3. To interface Gas Sensor (MQ-2) with Arduino for Smoke Detection
4. To interface ultrasonic sound sensor with Arduino and print the output on serial monitor
5. To interface temperature and humidity sensor with Arduino and print the output on LCD
6. Automatic street light control to control the street light (Turn on and off based on the light)using Arduino/Node MCU/RaspberryPi.
7. Detecting obstacle with IR Sensor and Arduino/Node MCU/RaspberryPi
8. To interface capacitor sensor (touch sensor) with smart phone and write a program to turnRGB LED ON/OFF when '1'/'0' is received from smart phone using Bluetooth.
9. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ONmotor when push button is pressed.
10. Write a program on Arduino/Raspberry Pi to upload and retrieve temperature and humiditydata to/from thingspeak cloud

Equipment required for Laboratories:

Boards:

1. Arduino Uno Board
2. Node MCU Board
3. Raspberry Pi Board

Sensor Modules:

1. Rain Drop Sensor
2. Soil Moisture Sensor
3. MQ-2 Gas Sensor
4. Ultrasonic sound sensor
5. DHT-11 Sensor
6. LDR Sensor
7. IR Sensor
8. Bluetooth Module (HC-05)
9. DC Motor
10. Relay Module

References:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD),2014, ISBN: 978935023975

Course Outcomes (COs):

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

1. Understand the concept of Internet of Things
2. Implement interfacing of various sensors with Arduino/Raspberry Pi.
3. Demonstrate the ability to transmit data wirelessly between different devices.
4. Show an ability to upload/download sensor data on cloud.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO–PO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	P O7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	-	-	-	3	-	-	-	-	-	-	3	-	-	-	2
CO2	3	3	3	3	3	2	-	-	3	3	1	3	-	-	-	2
CO3	3	3	3	3	3	2	-	-	3	3	1	3	-	-	-	2
CO4	3	3	3	3	3	2	-	-	3	3	1	3	-	-	-	2

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UEN12	L	T	P	SS	C
Course Name	Research Methodology (Mandatory Course)	2	0	0	0	0

COURSE OBJECTIVES:

1. To understand the objectives and characteristics of a research problem.
2. To analyze research related information and to follow research ethics
3. To understand the types of intellectual property rights.
4. To learn about the scope of patent rights.
5. To understand the new developments in IPR.

COURSE OUTCOMES:

1. At the end of the course, student will be able to
2. Understand objectives and characteristics of a research problem
3. Analyze research related information and to follow research ethics.
4. Understand the types of intellectual property rights.
5. Learn about the scope of IPR.
6. Understand the new developments in IPR.

UNIT - I

Research problem: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT - II

Literature study: Effective literature studies approaches, analysis Plagiarism, Research ethics, Technical writing: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT - III

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT - IV

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT - V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc, Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

REFERENCES BOOKS:

1. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
2. Mayall, "Industrial Design", McGraw Hill, 1992.

3. Niebel, "Product Design", McGraw Hill, 1974.
4. Asimov, "Introduction to Design", Prentice Hall, 1962.
5. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
6. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008
7. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes(PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO–PO MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1																
CO2																
CO3																
CO4																

ST.ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY: CHIRALA

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Year & Sem	III Year – II Semester					
Course Code	22UCS28	L	T	P	SS	C
Course Name	Python Programming Lab (Skill Course)	1	0	3	0	0

PREAMBLE:

COURSE OBJECTIVES:

The main objectives of the course are to • Introduce core programming concepts of Python programming language. • Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries • Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

UNTI-I:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.

2. Write a Program to display all prime numbers within an interval

3. Write a program to swap two numbers without using a temporary variable.

4. Demonstrate the following Operators in Python with suitable examples.

i)Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v)Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators

5. Write a program to add and multiply complex numbers

6. Write a program to print multiplication table of a given number.

UNIT-II:

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

1. Write a program to define a function with multiple return values.

2. Write a program to define a function using default arguments.

3. Write a program to find the length of the string without using any library functions.

4. Write a program to check if the substring is present in a given string or not.

5. Write a program to perform the given operations on a list: i. addition ii. insertion iii. slicing

6. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built In Functions Used on Dictionaries, Dictionary Methods, del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

7. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.

8. Write a program to count the number of vowels in a string (No control flow allowed).

9. Write a program to check if a given key exists in a dictionary or not.

10. Write a program to add a new key-value pair to an existing dictionary.

11. Write a program to sum all the items in a given dictionary.

UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.

2. Python program to print each line of a file in reverse order.

3. Python program to compute the number of characters, words and lines in a file.

4. Write a program to create, display, append, insert and reverse the order of the items in the array.

5. Write a program to add, transpose and multiply two matrices.

6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V: Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.

2. Python Program to demonstrate NumPy arrays creation using array () function.

3. Python program to demonstrate use of ndim, shape, size, dtype.

4. Python program to demonstrate basic slicing, integer and Boolean indexing.

5. Python program to find min, max, sum, cumulative sum of array

6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows: a) Apply head () function to the pandas data frame b) Perform various data selection operations on Data Frame

7. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.

2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024 3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai

2. https://www.coursera.org/learn/python?specialization=python#syllabus

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

CO3																
CO4																