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	1	--	--	4	30	70	100	3
ES	22UCS01	Programming for Problem Solving using C	3	1	--	--	4	30	70	100	3
ES	22UME02	Engineering Drawing	1	-	4	--	5	30	70	100	3
HS	22UEN01	Communicative English	3	1	--	--	4	30	70	100	3
BS	22UMT01	Mathematics – I	3	1	--	--	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	1	--	--	4	30	70	100	3
ES	22UCS04	Data Structures	3	1	--	--	4	30	70	100	3
ES	22UCS03	IT Workshop	1		4	--	5	30	70	100	3
HS	22UMT02	Mathematics - II	3	1	--	--	4	30	70	100	3
BS	22UPH01	Applied Physics	3	1	--	--	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
ES	22UEE08	Electro Magnetic Fields	3	1	--	--	4	30	70	100	3
ES	22UEE09	Power Systems-I	3	1	--	--	4	30	70	100	3
ES	22UEE10	DC Machines and Transformers	3	1		--	4	30	70	100	3
ES	22UEC03	Electronic Devices and circuits	3	1	--	--	4	30	70	100	3
ES	22UCS26	Object oriented programming with Java	3	1	--	--	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
ES	22UEE11	DCM&TF Lab	--	--	3	--	3	15	35	50	1.5
SC	22UEE12	Skill Course in MAT LAB	--	--	3	--	3	--	50	50	1
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	1	--	--	4	30	70	100	3
ES	22UEE13	Induction Motors and Synchronous Machines	3	1	--	--	4	30	70	100	3
ES	22UEE14	Power Systems-II	3	1		--	4	30	70	100	3
ES	22UEE15	Control Systems	3	1	--	--	4	30	70	100	3
ES	22UEC05	Switching Theory and Logic Design	3	1	--	--	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	--	50	50	1
TOTAL			17	5	12	-	34	240	560	800	20.5

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

S-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

William Hayt and Jack E. Kemmerley, Engineering Circuit Analysis, McGraw Hill Company, 6th Edition.2017

1) 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
CO1	3	3	-	-	-	-	-	-	-	-	-	1
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	3	3	2	2	1	-	-	-	1	1	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	1
CO5	3	3	2	2	1	-	-	-	1	1	-	-

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 computerprogram 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
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-
CO3	3	-	1	-	-	-	-	-	-	-	-	-
CO4	-	2	3	2	3	-	-	-	-	-	-	-
CO5	-	1	-	2	3	-	-	-	-	-	-	-

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
CO1	3	2	2	3	2	-	-	-	-	-	-	2
CO2	3	2	2	3	2	-	-	-	-	-	-	2
CO3	3	2	2	3	2	-	-	-	-	-	-	2
CO4	3	2	2	3	2	-	-	-	-	-	-	2
CO5	3	2	2	3	2	-	-	-	-	-	-	2

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 inspeaking 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
CO1	-	-	-	-	-	-	-	1	1	3	1	1
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	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
CO1	3	3	3	2	-	-	-	-	-	-	-	3
CO2	2	2	2	2	-	-	-	-	-	-	-	3
CO3	2	2	2	2	-	-	-	-	-	-	-	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3
CO5	3	3	3	2	-	-	-	-	-	-	-	3

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 cable s 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
CO1	2	2	-	-	-	2	-	-	-	2	-	3
CO2	1	2	-	-	-	1	-	-	-	-	-	1
CO3	2	2	-	-	-	2	-	-	-	-	-	3
CO4	2	2	-	-	-	2	-	-	-	-	-	2
CO5	3	1	-	-	-	2	-	-	-	-	-	3

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
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	1
CO5	-	-	-	-	-	-	-	-	-	3	-	-

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
CO1	3	2	3	1	2	-	-	-	-	-	-	1
CO2	3	-	-	2	3	-	-	-	-	-	-	1
CO3	-	3	-	2	3	-	-	-	-	-	-	1
CO4	3	2	-	2	3	-	-	-	-	-	-	1
CO5	3	-	2	2	3	-	-	-	-	-	-	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

The objectives of the course are to impart:

1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned Anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. 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
CO1	-	-	3	-	-	2	3	-	-	-	-	-
CO2	-	-	3	-	-	2	3	-	-	-	-	-
CO3	-	-	3	-	-	2	3	-	-	-	-	-
CO4	-	-	3	-	-	2	3	-	-	-	-	-
CO5	-	-	3	-	-	2	3	-	-	-	-	-

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**
CO1	**3**	3	1	-	-	-	-	-	-	-	-	2
CO2	**2**	2	1	-	-	-	-	-	-	-	-	1
CO3	**2**	2	2	-	1	-	-	-	-	-	-	1
CO4	**3**	3	1	-	2	-	-	-	-	-	-	2
CO5	**3**	2	-	1	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 efficientalgorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs arerepresented 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 Treesusing 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
CO1	3	2	3	2	3							2
CO2	3	1	2	2	3							1
CO3	3	1	2	2	3							2
CO4	3	3	2	2	3							2
CO5					1							2

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**
CO1	3	2	1	-	-	-	-	-	-	-	-	**1**
CO2	3	1	1	-	-	-	-	-	-	-	-	**1**
CO3	3	1	1	2	3	-	-	-	-	-	-	**2**
CO4	3	3	3	2	3	-	-	-	-	-	-	**2**

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
CO1	3	3	3	2	-	-	-	-	-	-	-	3
CO2	3	2	3	2	-	-	-	-	-	-	-	3
CO3	2	2	2	2	-	-	-	-	-	-	-	2
CO4	2	3	3	2	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	3

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

This course centers on unifying essential theoretical concepts of Physics governing the physical properties of materials to interpret them from the perspective of engineering and technical applications.

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
CO1	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	**3**	**-**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

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 Binarysearch 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 ascendingorder

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)

d) 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
CO1	3	2	3	2	3							2
CO2	3	1	2	2	3							2
CO3	3	1	2	2	3							2

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**
CO1	2	2	-	-	-	2	-	-	-	-	-	3
CO2	2	2	-	-	-	1	-	-	-	-	-	3
CO3	2	2	-	-	-	2	-	-	-	-	-	3
CO4	2	2	-	-	-	1	-	-	-	-	-	3
CO5	3	2	-	-	-	2	-	-	-	-	-	3

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
CO1	3	-	-	-	3	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-
CO3	2	-	-	-	3	-	-	-	-	-	-	-
CO4	3	-	-	-	3	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-

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
CO1	-	-	-	-	-	2	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	1	-	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	-

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
CO1	3	2	-	-	-	-	-	-	1	-	-	1
CO2	3	2	-	-	-	-	-	-	1	-	-	1
CO3	3	3	-	-	-	-	-	-	1	-	-	1
CO4	3	3	-	-	-	-	-	-	2	-	-	1
CO5	3	2	-	-	-	-	-	-	1	-	-	1

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
CO1	2	-	2	-	-	2	-	-	-	-	-	2
CO2	1	-	2	-	-	3	-	-	-	-	-	2
CO3	2	-	3	-	-	1	3	-	-	-	2	2
CO4	2	-	2	-	-	2	-	-	-	-	2	2
CO5	2	-	2	-	-	2	-	-	-	-	2	2

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 education 2010
5. Electric Machines by Mulukutla S.Sarma&Mukesh k.Pathak, CENGAGE Learning.
6. 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
CO1	2	2	-	-	-	2	-	1	-	-	1	2
CO2	2	2	-	-	-	2	-	1	-	-	1	2
CO3	2	2	-	-	-	2	-	1	-	-	1	2
CO4	2	2	-	-	-	2	-	1	-	-	1	2
CO5	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, selfbias, 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:

Electronic Devices and Circuits-J.Millman, C.Halkias, Tata Mc-Graw Hill, Second Edition, 2007

Electronics devices & circuit theory-Robert L.Boylestad and Loui Nashelsky, Pearson / Prenticehall, tenth edition, 2009

Electronic Devices and Circuits-K. Lal Kishore, BS Publications, Fourth Edition, 2016.

References:

Microelecrtronic circuits Theory and applications.-Adel S.sedra,Kenneth C.Smith,OXFORD international student Edition, Sixth Edition,2013

Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications

ElectronicDevicesandCircuits-Salivahanan,Kumar,Vallavaraj,TataMc-GrawHill,4th Edition, 2008.

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	-	-	2	-	-	-	-	-	2	2
CO2	3	3	3	-	-	-	-	-	2	-	2	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2
CO4	3	3	-	-	-	-	-	-	-	2	2	2
CO5	3	3	3	3	-	-	-	-	2	2	-	2

Year & Sem	II Year – ISemester					
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
CO1	3	-	-	-	3	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-
CO3	2	-	-	-	3	-	-	-	-	-	-	-
CO4	3	-	-	-	3	-	-	-	-	-	-	-

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 defined 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
CO.1	**2**	**2**	**2**	**1**	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**1**
CO.2	**2**	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**1**	**1**	**1**	**1**
CO.3	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**1**	**1**	**1**
CO.4	**2**	**3**	**3**	**2**	**2**	**1**	**-**	**1**	**1**	**1**	**1**	**1**
CO.5	**2**	**3**	**3**	**3**	**2**	**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
CO1	2	2	-	-	-	2	-	1	-	-	1	2
CO2	2	2	-	-	-	2	-	1	-	-	1	2
CO3	2	2	-	-	-	2	-	1	-	-	1	2
CO4	2	2	-	-	-	2	-	1	-	-	1	2
CO5	2	2	-	-	-	2	-	1	-	-	1	2

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

COURSE OBJECTIVES:

5. To gain basic knowledge MATLAB interface and learn baic concepts in programming.
6. To develop knowledge on core programming skills in MATLAB.
7. To analyze given data and present pictorially using 2-D and 3-D plots
8. To give insight idea on how to work with files in MATLAB
9. To formulate and Solve differential equations in MATLAB.

COURSE OUTCOMES:

CO1: Outline the basic concepts of MATLAB.
CO2: Develop programs for scientific and mathematical problems.
CO3: Analyze an engineering system/Problem through graphical representation and numerical analysis.
CO4: Build optimized code for various applications in Engineering and Technology.
CO5: To solve complex differential equations using MATLAB

UNIT - I

Introduction: Starting MATLAB, working in command window, Arithmetic operations, Display formats, Elementary Math Built-in functions, defining scalar variables, useful commands for managing variables, Script files, Examples of MATLAB applications

UNIT - II

Creating arrays and Mathematical operations with arrays: Creating 1- dimensional and 2-dimensional arrays, The Transpose operator, Array addressing, using a colon: in addressing arrays, Adding elements to existing variables, Deleting elements, Built in functions for handling arrays, Strings and strings as variables, Addition and Subtraction, Array Multiplication and Division, Element-by-Element operations, using arrays in MATLAB built-in math functions, Built in functions for analysing arrays, Generation of Random Numbers, Examples of MATLAB applications

UNIT - III

Two Dimensional and Three-Dimensional Plots: plot, fplot commands, formatting a plot, plots with logarithmic axes, error bars, special graphics, Histograms, Polar plots, putting multiple plots on the same page, Multiple figure windows, Examples, Line plots, Mesh and surface plots, plots with special graphics, The view command, Examples of MATLAB applications

UNIT - IV

Programming in MATLAB: Relational and Logical operators, conditional statements, the switch-case statement, Loops, Nested Loops and Nested conditional statements, The break and continue commands, creating a function file, structure of a function file, Local and Global variables, saving a function file, using a User-defined function, Examples of simple User-defined functions, comparison between script files and function files.

UNIT - V

Polynomial, Curve-fitting, Interpolation, Numerical Analysis: Polynomials, curve fitting, Interpolation, The Basic fitting interface, Examples, solving equation of one variable, Finding minimum or maximum of a function, Numerical integration, ordinary differential equations.

Text Books:

1) MATLAB: An Introduction with applications – Amos Gilat, Wiley India Pvt. Ltd, 4th Ed.,2012.

Reference Books:

4. Getting started with MATLAB – Rudra Pratap, Oxford University Press, 2010 2.
5. MATLAB and SIMULINK for Engineers – Agam Kumar Tyagi, Oxford University Press, 2012.

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
CO1	2									1		
CO2	3									2		
CO3		2								2		
CO4	3									2		
CO5	3									2		

Programme	CIVIL, EEE, ECE, 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, 10th 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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	3	3	1	-	-	-	-	-	-	-	1	-	-	-
CO 2	3	3	3	2	-	-	-	-	-	-	-	2	-	-	-
CO 3	2	3	3	1	-	-	-	-	-	-	-	2	-	-	-
CO 4	2	3	3	1	-	-	-	-	-	-	-	3	-	-	-
CO 5	3	3	3	2	-	-	-	-	-	-	-	2	-	-	-

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
CO1	2	-	-	-	-	1	-	-	-	-	-	2
CO2	-	2	2	2	-	1	-	-	-	-	-	2
CO3	-	2	2	2	-	1	-	-	-	-	-	2
CO4	-	2	2	2	-	1	-	-	-	-	-	2
CO5	2	-	2	-	-	1	-	-	-	-	-	2

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
CO1	-	2	2	2	-	1	-	-	-	-	-	2
CO2	-	2	2	2	-	1	-	-	-	-	-	2
CO3	-	2	2	2	-	1	-	-	-	-	-	2
CO4	-	2	2	2	-	1	-	-	-	-	-	2
CO5	-	2	2	2	-	1	-	-	1	1	-	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:

CO4 : Appliying bode plots for design and analysis of compensators applications.
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.
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
CO1	3	3	3	3	-	1	-	-	-	-	-	3
CO2	3	1	3	3	-	1	-	-	1	-	-	3
CO3	3	3	3	3	-	1	-	-	-	-	-	3
CO4	3	3	3	3	-	1	-	-	-	-	-	3
CO5	3	3	3	3	-	1	-	-	-	-	-	3

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 Learning 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.

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:

https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf
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
CO1	2	-	-	-	-	2	-	-	-	-	-	2
CO2	2	-	-	-	-	2	-	-	-	-	-	2
CO3	2	-	-	-	-	2	-	-	-	-	-	2
CO4	2	-	-	-	-	2	-	-	-	-	-	2
CO5	2	-	-	-	-	2	-	-	-	-	-	2

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
CO1	-	3	-	-	-	1	-	-	-	-	-	2
CO2	2	-	3	-	-	1	-	-	-	-	-	2
CO3	-	2	3	-	-	1	-	-	-	-	-	2
CO4	2	-	-	-	-	1	-	-	-	-	-	2
CO5	-	2	-	2	-	1	-	-	-	-	-	2

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.

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
CO1	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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
CO1	-	3	-	-	-	1	-	-	-	-	-	2
CO2	-	-	3	-	-	1	-	-	-	-	-	2
CO3	-	-	3	-	-	1	-	-	-	-	-	2
CO4	2	-	-	2	-	1	-	-	-	-	-	2
CO5	2	2	-	2	-	1	-	-	-	-	-	2

Year & Sem	II Year – I Semester					
Course Code	22UEN09	L	T	P	SS	C
Course Name	Skill Course in Employability Skills	0	0	3	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