DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For UG –R22

B. TECH –ELECTRONICS & COMMUNICATION 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
BS	22UMT01	Mathematics – I	3	1	--	--	4	30	70	100	3
HS	22UEN01	Communicative English	3	1	--	--	4	30	70	100	3
BS	22UCH01	Applied Chemistry	3	1	-	--	4	30	70	100	3
ES	22UEE05	Basic Electrical Engineering	3	1	--	--	4	30	70	100	3
ES	22UCS01	Programming for Problem Solving using C	3	1	--	--	4	30	70	100	3
HS	22UEN02	English Communication Skills Laboratory	--	--	3	--	3	15	35	50	1.5
BS	22UCH02	Applied Chemistry Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UCS02	Programming for Problem Solving Using C Laboratory	--	--	3	--	3	15	35	50	1.5
MC	22UCH03	Environmental Science	2	--	--	--	2	--	--	--	0
TOTAL			17	5	9	-	31	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
BS	22UMT02	Mathematics - II	3	1	--	--	4	30	70	100	3
BS	22UPH01	Applied Physics	3	1	--	--	4	30	70	100	3
ES	22UEC01	Digital Logic Design	3	1	--	--	4	30	70	100	3
ES	22UEE06	Network Analysis	3	1	--	--	4	30	70	100	3
ES	22UCS03	IT Workshop	1	-	4	-	5	15	35	50	3
BS	22UPH02	Applied Physics Laboratory	--	--	3	--	3	15	35	50	1.5
ES	22UEC02	Electronic Workshop	--	--	3	--	3	15	35	50	1.5
ES	22UEE07	Basic Electrical Engineering 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

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: II Semester: III

S.No	Category	Course Code	Course Title	Hours per week			Marks			Credits
				L	T	P	Int	Ext	Total	C
1	PC	22UEC03	Electronic Devices and Circuits	3	1	0	30	70	100	3
2	ES	22UCS05	Python Programming	3	1	0	30	70	100	3
3	BS	22UMT03	Mathematics - III	3	1	0	30	70	100	3
4	PC	22UEC07	Signals & Systems	3	1	0	30	70	100	3
5	PC	22UEC08	Random Variables and Stochastic Processing	3	1	0	30	70	100	3
6	LC	22UCS07	Python Programming Lab	0	0	3	15	35	50	1.5
7	LC	22UEC04	Electronic Devices Circuits Lab	0	0	3	15	35	50	1.5
8	LC	22UEC06	Switching Theory and Logic Design Lab	0	0	3	15	35	50	1.5
9	SC	22UEN06	Soft Skills - I	0	0	4	-	50	50	2
Community Service Project				**Community Service Project (Mandatory) (to be evaluated during IV semester)**						
Total Credits										**21.5**

Year: II Semester: IV

S.No	Category	Course Code	Course Title	Hours per week			Marks			Credits
				L	T	P	Int	Ext	Total	C
1	PC	22UEC09	Electronic Circuit Analysis	3	1	0	30	70	100	3
2	ES	22UCS04	Data Structures	3	1	0	30	70	100	3
3	PC	22UEC10	Analog Communications	3	1	0	30	70	100	3
4	PC	22UEC11	Electromagnetic Waves and Transmission Lines	3	1	0	30	70	100	3
5	PC	22UEC12	Linear Control Systems	3	1	0	30	70	100	3
6	LC	22UEC13	Electronic Circuit Analysis Lab	0	0	3	15	35	50	1.5
7	LC	22UEC14	Analog Communications Lab	0	0	3	15	35	50	1.5
8	LC	22UCS06	Data Structures Lab	0	0	3	15	35	50	1.5
9	SC	22UEN07	Soft Skills-II	0	0	4	--	50	50	2
10	MC	22UEN04	Essence of Indian Traditional Knowledge	3	0	0	--	--	--	0
11			**Community Service Project**	**Community Service Project (Mandatory) (to be evaluated during IV semester)**			100	--	100	4
12	**Internship-II for 2 Months (Mandatory) during summer vacation**									
Total Credits										**25.5**
13	Minor		Electronics Devices and Basic Circuits	3	1	0	30	70	100	4
14	Honors		Any course from the Pool, as per the opted track	3	1	0	30	70	100	4

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:

- To instruct the concept of Matrices in solving linear algebraic equations.
- To assist the students to learn the concepts of partial differentiation.
- To enlighten the learners in the concept of differential equations.
- 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.
- 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 e^{ax}, sin ax, cos ax, polynomials in x^n, $e^{ax}V(x)$ and $x^nV(x)$ –

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

CO – PO and PSO MAPPINGS:

	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	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:

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

Course Outcomes:

Attheendofthemodule, thelearnerswillbeableto

- Comprehend social or transactional discussions presented by native English speakers and recognize the context, subject, and specific information.
- Introduce one self and others and engage in general conversation about well-known subjects.
- Employsuitablestrategiesforskimmingandscanningtogetthegeneralideaofatextandlocate specificinformation.
- Recognizeparagraphstructureandbeabletomatchbeginnings/endings/headingswithparagraphs
- Formsentencesusingproper grammaticalstructuresandcorrectwordforms.

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 toprose andconversations. **Speaking:**Askingandanswering generalquestionsonfamiliartopicssuchashome,family, work studiesandinterests. Self-introductionandintroducingothers. **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, signpostsandtransitionsignals;mechanicsofwriting-punctuation,capitalletters.

Vocabulary: Synonyms and Antonyms,Affixes.

Grammar: Content words and function words, word forms.

Unit-2

Lesson-1:Nehru'slettertohisdaughterIndiraonherbirthdayfrom "**InfotechEnglish**",MaruthiPublications.
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; recognizingverbaltechniques thathelptolinktheideasina paragraphtogether. **Writing**: Summarizing - identifying main idea and rephrasing what is read; avoidingredundanciesandrepetitions.**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 speakingandwriting.**Speaking:**Discussing specifictopicsinpairsorsmallgroupsandreportingwhatisdiscussed. FunctionalEnglish: ComplainingandApologizing.**Reading**: Reading a text in detail by making basic inferences - recognizing and interpreting specificcontextclues;strategiestousetextcluesforcomprehension. Criticalreading.**Writing**: Letterwriting-types,formatandprinciplesofletterwriting. E-mailetiquette,WritingCV's.
Vocabulary: Synonyms and Antonyms, Word Formation

Grammar: **Verbs, Subject Verb agreement, Common Errors.**

Unit4

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

Listening: Making predictions while listening to conversations/ transactional dialogues without video(onlyaudio);listeningtoaudio-visualtexts.**Speaking:**RoleplaysforpracticeofconversationalEnglishinacademiccontexts(formalandinformal) - asking for and giving information/directions. Functional English: Permissions, Requesting,Inviting.**Reading**:Studyingtheuseofgraphicelementsintextstoconveyinformation,revealtrends/patterns /relationships,communicative processordisplaycomplicateddata.
Writing: Information transfer; describe, compare, contrast, identify significance/trendsbasedoninformationprovidedinfigures/charts/graphs / tables, writingfor media.**Vocabulary**: Synonyms and Antonyms, Phrasal verbs.

Grammar:Tenses, correction of sentences.

Unit5

Lesson-1:StayHungry-Stayfoolishfrom"**InfotechEnglish**", MaruthiPublications

Listening: Identifyingkeyterms,understandingconceptsandinterpretingtheconceptsbothinspeakingandwriting, TEDX Videos.**Speaking:**Formaloralpresentationsontopicsfromacademiccontexts-withouttheuseofPPTslides. FunctionalEnglish:Suggesting/Opiniongiving.**Reading**:Readingforcomprehension.RAPStrategy IntensivereadingandExtensivereadingtechniques.**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.

Suggestedbooks:

1. **InfotechEnglish**",MaruthiPublications.
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 (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	-	-	-	-	-	-	-	1	1	3	1	1
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-

Year &Sem	I Year – I Semester					
Course Code	22UCH01	L	T	P	SS	C
Course Name	APPLIED CHEMISTRY	3	1	0	0	3

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

COURSE OBJECTIVES

1. Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
2. Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented
3. Explain the preparation of nanomaterials, engineering applications of nanomaterials, superconductors, preparation of semiconductors and applications of Hall effect.
4. Importance of Non-conventional Energy Resources, its design and working along with Fuel cells and Spectroscopic techniques.
5. Outline the basics of computational chemistry and molecular switches.

COURSE OUTCOMES:

1. Analyzetypes of plastics, methods of fabrication, the differenttypesofcompositeplasticmaterialsandinterpretthemechanismof conduction inconductingpolymers.
2. Understand the theory of construction of electrodes, batteries in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
3. Understand synthesis of nanomaterials for modern advances of engineering technology analyze the applications of super conductors. Summarize the preparation of semiconducting; analyse the applications of Hall effect.
4. Analyze different models of energy harnessing from different natural sources and also working and applications of Fuel cells and Spectroscopic Techniques.
5. Understand the knowledge of computational chemistry and molecular machines.

UNIT I: POLYMER TECHNOLOGY (8hrs)

Polymerization: -Introduction, types and methods of polymerization (emulsion and suspension), mechanical properties.

Plastics: Types, Compounding, Fabrication (compression, injection, blowing and extrusion moldings), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste (waste to wealth).

Elastomers: -Introduction, vulcanization of rubber, advantages of vulcanized rubber, preparation, properties and applications (BunaS, Thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable and biomedical polymers.

Course Outcomes: At the end of this unit, the students will be able to **Analyze** types of plastics, methods of fabrication, the differenttypesofcompositeplasticmaterialsandinterpretthemechanismof conduction inconductingpolymers.

UNIT II: ELECTRO CHEMICAL CELLS AND CORROSION (10hrs)

Electrochemical cell, Single electrode potential, standard hydrogen electrode, calomel electrode, construction of glass electrode, electrochemical series and uses of series, galvanic series, differentiation between electrochemical series and galvanic series, batteries (Dry cell, Li ion battery and zinc air cells).**Corrosion**: -Definition, factors influencing rate of corrosion, theories of corrosion (direct chemical attack and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, corrosion

control (proper designing and cathodic protection), Protective coatings (surface preparation, cathodic coatings, anodic coatings, electroplating and electroless plating [nickel]),Paints(constituents and special paints).

Course Outcomes: At the end of this unit, the students will be able to **Utilize** the theory of construction of electrodes, batteries in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

UNIT III: MATERIAL CHEMISTRY **(10hrs)**

PART I:

NANOMATERIALS:

Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerences, carbon nanotubes (types, preparation and applications).

Super conductors: TypeI, TypeII, characteristics and applications

PART II:

Non–elemental semiconducting materials:

Stoichiometric, controlled valency& chalcogen photo / semiconductors-preparation of semi conducting (distillation, zone refining, czochralski crystal pulling, epitaxy, diffusion, ion implantation) – semiconducting devices (p-n junction diode as rectifier, junction transistor).

Magnetic materials: ferro and ferri magnetism – Hall effect and its applications.

Course outcomes: at the end of this unit, the students will be able to

- **Synthesis** nanomaterials for modern advances of engineering technology analyze the applications of superconductors.
- **Summarize** the preparation of semiconducting; analyze the applications of Hall effect.

UNIT IV: NON–CONVENTIONAL ENERGY SOURCES & FUEL CELLS **(8hrs)**

NON–CONVENTIONAL ENERGY SOURCES:

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

Fuel cells: Construction, Working and Applications (H2-O2, CH3OH-O2, phosphoric acid and molten carbonate).**Spectroscopic techniques:** Electromagnetic spectrum, UV laws of absorption, instrumentation, chromophores and auxochromes, intensity shifts and applications. FTIR instrumentation and applications.

Course outcomes: At the end of this unit, the students will be able to

- **Design** models for energy by different natural sources.
- **Analyze** the working of and applications of Fuel cells.

UNIT V: ADVANCED CONCEPTS / TOPICS IN CHEMISTRY **(8 hrs)**

Computational chemistry: Introduction to computational chemistry, molecular modelling and docking studies, **Molecular switches:** characteristics of molecular motors and machines, rotaxanes and catenanes as Artificial molecular machines, prototypes – linear motions in rotaxanes, an acid – base controlled molecular shuttle, a molecular elevator, an autonomous light -powered molecular motor.

Course out comes: At the end of this unit, the students will be able to

- **Obtain** the knowledge of computational chemistry and molecular machines.

Standard books:

1. P.C.JainandM.Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, "**Engineering Chemistry**", Cambridge University Press, New Delhi, (2019).
3. Shashi Chawla, "**Engineering Chemistry**", Dhanpat Rai Publication Co. (Latest edition).

Reference Books:

1. K.SeshaMaheshwaramma and MridulaChugh, "**Engineering Chemistry**", Pearson India Edn.
2. O.G.Palana, "**Engineering Chemistry**", Tata Mc.Graw Hill Education Private Limited, (2009).
3. CNR Rao and JM Honig (Eds) "**Preparation and characterization of materials**" Academic press, NewYork (latest edition).
4. B.S.Murthy, P.Shankar and others, "**Text book of Nano science and Nano technology**", University press (latest edition).

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

CO – PO MAPPING:

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

Year &Sem	I Year – I Semester					
Course Code	22UEE05	L	T	P	SS	C
Course Name	BASIC ELECTRICAL ENGINEERING	3	1	0	0	3

Course Educational Objectives:

- To understand the principle of operation, constructional details and operational characteristics of DC generators.
- To understand the principle of operation, characteristics of DC motor. Methods of starting and speed control methods of DC motors.
- To learn the constructional details, principle of operation and performance of transformers.
- To study the principle of operation, construction and details of synchronous generators.
- To learn the principle of operation, constructional details, performance, torque – slip characteristics and starting methods of 3-phaseinductionmotors.
- To understand the principle of operation of different measuring instruments

Course Outcomes:

CO1. Able to explain the operation of DC generator and analyze the characteristics of DC generator.
CO2. Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors.
CO3. Ability to analyze the performance and speed – torque characteristics of a3- phase induction motor and understand starting methods of 3- phase induction motor.
CO4. Able to explain the operation of Synchronous generators
CO5. Capability to understand the operation of various electrical measuring instruments.

UNIT I

DC MACHINES: Principle of operation of DC Machines- EMF equation – Types of generators –Magnetization and load characteristics of DC generators

D.C. MOTORS: Types of DC Motors – Torque Equation, Characteristics of DC motors – starters forDC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT II

TRANSFORMERS: Principle of operation of single-phase transformer– Types and Constructional features, EMF Equation– No load and on load Phasor diagrams –Equivalent circuit-Losses and Efficiency of transformer and Regulation–OC and SC tests–Predetermination of efficiency and regulation.

UNIT III

SINGLE PHASE INDUCTION MOTORS: Principle of operation- Double Filed Revolving Theory - Shaded pole motors – Capacitormotors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

ALTERNATORS: Alternators – Types and Constructional features – Principle of operation – EMF Equation– Distribution and Coil span factors–Predetermination of regulation of Alternator by OC and SC tests (Synchronous Impedance Method).

UNIT IV

THREE PHASE INDUCTION MOTOR: Principle of operation of three-phase induction motors– Constructional features Squirrel cage and Slip ring motors– Concepts of Slip, Slip-Torque characteristics–Star-Delta starting method.

UNIT V

ELECTRICAL INSTRUMENTS: PMMC, Moving iron type and electrostatic instruments, Construction, Torque equation, Range extension (Ammeters and Voltmeters).

TEXT BOOKS:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M.S.Sukhija, Oxford University Press, 2005

REFERENCES:

1. Principles of Electrical Engineering - V. K Mehta, S.Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarathamd D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

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

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

CourseObjectives:

Theobjectives of ProgrammingforProblem SolvingUsingC are

- Tolearnaboutthe computersystems,computingenvironments,developingof acomputerprogramand StructureofaC Program
- Togainknowledgeoftheoperators, selection,control statementsandrepetition inC
- Tolearnaboutthedesignconceptsofarrays,strings
- Toassimilateaboutpointers,dynamicmemoryallocation
- ToassimilateaboutFile, I/Oandsignificanceoffunctions

CourseOutcomes:

Uponthecompletionofthecoursethestudentwill 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

IntroductiontoComputers: ComputerSystems–BlockDiagramofComputer,Hardware,Software,Algorithms, Flow Charts, Pseudocode**IntroductiontotheCLanguage:**Background,CPrograms,Identifiers,Types,Variable,Constants,Input/output, ProgrammingExamples.**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&MakingDecisions:**LogicalDataandOperators,TwoWaySelection,MultiwaySelection,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,UsingArrayinC,ArrayApplication,TwoDimensionalArrays,MultidimensionalArrays, ProgrammingExamples.**Strings:**StringConcepts,CString,StringInput/OutputFunctions,ArraysofStrings,StringManipulationFunctions, ProgrammingExamples.

UNIT-IV

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Types offunctions, 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 inStructures,ArrayofStructures,StructurePointers,structuresandfunctions,UnionsandProgrammingExamples.
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

TextBooks:

1) ProgrammingforProblemSolving,BehrouzA.Forouzan,RichardF.Gilberg,CENGAGE.
2) TheCProgramming Language, BrianW.Kernighan, DennisM.Ritchie,2e,Pearson.

ReferenceBooks:

1) ComputerFundamentalsandProgramming,SumithabhaDas,McGrawHill.
2) ProgramminginC,AshokN.Kamthane,AmitKamthane,Pearson.
3) ComputerFundamentalsandProgramminginC,PradipDey,ManasGhosh,OXFORD.

Contribution of Course Outcomes (CO's) towards the achievement of programme outcomes (PO's) (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	22UEN02	L	T	P	SS	C
Course Name	ENGLISH COMMUNICATION SKILLS LAB	0	0	3	0	1.5

Course Objectives

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

CourseOutcomes:

Bythe end of the semester the learners develop

1. Proper and accurate articulation of the sounds by following standard pronunciation of words and communicate intelligibly.
2. Speaking fluently with neutral accent.
3. Clarity of speech.
4. To communicate in various contexts using choice of appropriate expressions.
5. To acquire several communicative functions. Thereby enable to interact in different social and work situations.

The course material is divided into five units.

Unit1:

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

Unit2

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

Unit3:

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

Unit4:

Just A Minute (JAM)

Unit5:

Group Discussions and Interview Skills

Suggested 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, DrSalivendra 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 (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	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	1
CO5	-	-	-	-	-	-	-	-	-	3	-	-

Year & Sem	I Year – I Semester					
Course Code	22UCH02	L	T	P	SS	C
Course Name	APPLIED CHEMISTRY LABORATORY	0	0	3	0	1.5

Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, volumetric titrations, quantitative analysis

1. Determination of HCl using standard Na2CO3 solution.
2. Determination of alkalinity of a sample containing Na2CO3 and NaOH.
3. Determination of Mn+2 using standard oxalic acid solution.
4. Determination of ferrous iron using standard K2Cr2O7 solution.
5. Determination of Cu+2 using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe+3 by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metrymethod).
9. Determination of pH by using pH-meter.
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).
12. Determination of Mg+2 present in an antacid.
13. Determination of CaCO3 present in an egg shell.
14. Estimation of Vitamin C.
15. Determination of phosphoric content in soft drinks.
16. Adsorption of acetic acid by charcoal.
17. Preparation of nylon-6, 6 and Bakelite (demonstration only).

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Outcomes:

The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus, at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.

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

CO – PO and PSO MAPPINGS:

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

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

Course Objectives:

- Applythe principles ofClanguageinproblem solving.
- Todesignflowcharts,algorithmsand knowinghowtodebugprograms.
- Todesign&developof Cprogramsusingarrays,stringspointers &functions.
- Toreviewthefileoperations.

CourseOutcomes:

Bythe end of the Lab, thestudent

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

Exercise1:

1. WriteaCprogramtoprintablockFusinghash(#),wheretheFhasaheightofsixcharacters andwidthoffiveandfour characters.
2. WriteaCprogramtocomputetheperimeterandareaofarectanglewithaheightof7inches and width of 5inches.

Exercise2:

1. WriteaCprogram tocalculate thedistancebetweenthe twopoints.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positiveand p is even. If q is greater than r and s is greater than p and if the sum of r and s is greaterthan the sumofpandqprint"Correct values",otherwiseprint"Wrongvalues".

Exercise3:

1. Write a program in C which is a Menu-Driven Program to compute the area of the variousgeometricalshape.
2. WriteaCprogram to calculate thefactorial ofa givennumber.

Exercise4:

1. WriteaprograminCtodisplaythentermsofharmonicseriesandtheirsum.1+1/2+1/3 +1/4 + 1/5 ... 1/n terms.
2. WriteaC programto check whethera given numberis an Armstrongnumberornot.

Exercise5:

1. Writeaprogramtodisplayallprimenumberslessthann
2. Writeaprogram todisplaythefollowingoutputformat

```
1
2   2
3   3   3
4   4   4   4
5   5   5   5   5
```

Exercise6:

1. Write a program in C to separate odd and even integers in separate arrays.
2. Writea program in C to sort elements of arrayin ascendingorder.

Exercise7:

1. WriteaprograminC formultiplication oftwo squareMatrices.
2. Writeaprogram inC to findtranspose of a given matrix

Exercise8:

1. Writeaprogram in Cto comparetwo stringswithout usingstringlibraryfunctions.
2. Writeaprogram in C to copyonestringto another string.

Exercise9:

1. Writeacprogram toread and displaythe detailsof an employeeusingstructure
2. Writeacprogram to demonstrate arrayof structures

Exercise10:

1. WriteaprograminCtodemonstratetheuseof&(addressof)and*(valueataddress)operator.
2. WriteaC program to find sum of n elements entered byuser usingpointers
3. WriteaCProgram toStoreInformationUsing StructureswithDynamicallyMemoryAllocation

Exercise11:

1. Writeaprogramin C toswap elements usingcall byreference
2. Findfactorial ofgiven numberusingrecursion
3. Writeaprogram inC to get thelargest element ofanarrayusingthe function

Exercise12:

1. Writeaprogramin Cto appendmultiple linesat theend ofatext file.
2. Writeaprogram in C to copyafilein another name.
3. Writeaprogramin Cto removea filefrom the disk

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	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:

- Overall understanding of the natural resources.
- Basic understanding of the ecosystem and its diversity.
- Acquaintance on various environmental challenges induced due to unplanned Anthropogenic activities.
- An understanding of the environmental impact of developmental activities.
- 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

eference:

1. TextBookofEnvironmentalStudies,DeeshitaDave&P.UdayaBhaskar,CengageLearning.
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 (CO's) towards the achievement of programme outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

	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	22UMT02	L	T	P	SS	C
Course Name	MATHEMATICS-II	3	1	0	0	3

Course Objectives:

- To illuminate the different numerical methods to solve nonlinear algebraic equations.
- To give a definition of Interpolation as it relates to mapping / surveying.
- To familiarize the Laplace, transform techniques in solving the Differential Equations.
- To familiarize the Fourier Series expansions for periodic functions.
- 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 andTranscendental 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, 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. **B.V.Ramana,** Higher Engineering Mathematics, 2007 Edition,Tata Mc.Graw Hill Education.
3. **N.P.Bali, ManishGoyal**, A text book of Engineering Mathematics, Lakshmi Publications
4. **ErwinKreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

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	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 deBroglie 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:

1. Select the concepts of Physical Optics in view of engineering applications. Apply the knowledge of dielectric and magnetic materials to analyze them.
2. Grade the wavelengths of Lasers for suitable applications in the field of industry, medicine and communication and foster the knowledge on optical fibers.
3. Appraise electron dynamics based on quantum principles.
4. Choose dielectric and magnetic material to demonstrate the functioning of electric and electronic devices.
5. 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 (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	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	22UEC01	L	T	P	SS	C
Course Name	DIGITAL 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.

Course Outcomes:

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

CO1: Define different number representation and conversion from one radix to other.
CO2: Explain the minimization techniques using Boolean algebra and K-map method.
CO3: Analyze and design the combinational logic circuits.
CO4: Design the sequential circuits using Flip-Flops.
CO5: Design the registers and counters.

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, Demultiplexers, 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.

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.Anand Kumar, PHI Learning pvtltd, 2016.
3. Digital fundamentals by Thomas L.Floyd, Pearson EDU India.

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

Year & Sem	I Year – II Semester					
Course Code	22UEE06	L	T	P	SS	C
Course Name	NETWORK ANALYSIS	3	1	0	0	3

COURSE OBJECTIVES

- To understand the different types of sources, network reductiontechniques.
- To understand the various network topologies and network theorems
- To solve the AC circuits using steady stateanalysis
- To define the resonance and resonanceparameters
- To introduce the concepts of transients for series RL RC and RLCcircuits.
- To analyze the two portnetworks.

COURSE OUTCOMES

Student will be able to

CO1: To understand the different types of sources, network reductiontechniques.

CO2: To solve the AC circuits using steady stateanalysis

CO3: To define the resonance and resonanceparameters

CO4: To introduce the concepts of transients for series RL RC and RLCcircuits

CO5: To analyze the two portnetworks.

UNIT I:

INTRODUCTION TO ELECTRICAL CIRCUITS

Network elements classification, Voltage and Current sources – Independent and dependent sources, Ohm's law, Kirchhoff's laws, problem solving with independent source only. Network reduction techniques - Source transformation, star-to-delta and delta-to-startransformation,Voltageandcurrentdivision,series,paralleland seriesparallelnetworks-Nodalanalysisandmeshanalysis with independent and dependentsources – Numerical Problems

NETWORK THEOREMS: Superposition, Thevenin's, Norton's, and Maximum Power Transfer theorems, Reciprocity and Compensation (without Proof only statements) - problem solving using independent Sources.

UNIT II:

STEADY STATE ANALYSIS OF A.C CIRCUITS

Rms and Average Values, Phase and phase difference –Response of R, L and C elements for sinusoidal excitation, Steady state analysis of RL, RC and RLC circuits for sinusoidal excitation, Pharos diagrams, Concept of reactance,impedance,susceptanceandadmittance,Active&reactivepower,Powerfactor,power triangle, Numerical problems.

UNIT III:

RESONANCE: Series Resonance, Parallel resonance, Bandwidth, Quality factor and Selectivity

COUPLED CIRCUITS: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Ideal transformer, Dot Convention in coupled circuits, conductively coupled equivalent circuits.

UNIT IV:

TRANSIENTS

Introductiontotransientanalysis,initialconditions,transientresponseofSeriesRL,RCandRLC circuits using DC and sinusoidal excitations, Solution using differential equation approach and Laplace transforms.

UNIT V:

TWO PORT NETWORKS

Two Port Network parameters: Z-parameters,Y-parameters,ABCDparameters,h-parameters, Inverse h - parameters, Inverse ABCD parameters, Relationship between parameter sets, Interconnection of two port networks.

TEXT BOOKS

1. WilliamH.Hayt&JackE.Kemmerly&StevenM.Durbin,**EngineeringCircuitAnalysis,**6th Edition, TATA McGrawHill Company,2009.
2. A. Chakrabarthi, **Circuits Theory**, DhanpatRai& Co, New Delhi,2009.
3. A. Sudhakar&Shyam Mohan**, Electric Circuits**, 3rd Edition, C,2007.
4. Ravish R Singh, **Network Analysis & Synthesis**, McGraw Hill (India) Education Private Limited,2013.
5. B. Subramanyam, **Circuit analysis**, IK Publications,2006.
6. Charles K. Alexander, M. N. O. Sadiku- **Fundamentals of Electric Circuits**.

REFERENCEBOOKS

1. M. E. Schultz, Grob's B**asic Electronics**, 10th Edition, McGrawHill.
2. M.E.VanValkenburg, **Network Analysis**, Third Edition, Low PriceEdition.
3. John. D. Ryder, **Network lines and Fields,** 2nd Edition, Asia Publishinghouse.
4. DR Cunninghan, **Basic Circuit Analysis,** JaicoPublishers.

WEB LINKS:

1. https://books.google.com/
2. www.nptel.ac.in/
3. www.Electrical4u.com

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

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

CourseObjectives:
Theobjectiveofthis labis to

- Explaintheinternalpartsofacomputer,peripherals,I/Oports,connectingcables
- DemonstratebasicDOScommands
- DescribeaboutAntivirustools
- DemonstrateOfficeToolssuchasWordprocessors,SpreadsheetsandPresentationtools

CourseOutcomes:
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

ListofExperiments:

UNIT-1
Block diagram of a computer, Identification of peripherals of a PC, Laptop, Server, Smartphones, prepare a report containing the block diagram along with the configuration of eachcomponentanditsfunctionality,Input/Outputdevices,I/OportsandInterfaces,MainMemory,CachememoryandSecondaryStorageDevices, DigitalStorageBasics,NetworkingComponents and Speeds.
Experiment -1: Identification of peripherals.
Experiment-2: Assembling,Dissemblingofacomputer.

UNIT-2
Software:Definition,Softwaretypes,ApplicationSoftware,SystemSoftware**.**
Experiment-1:DOS Commands.

UNIT-3
MSWord: Creating a Document, Formatting, Bullets and Numbering, Page Settings, HeaderandFooter,InsertWordArt,Clip Art,Tables.
Experiment -1: Demonstrate and practice on wordFormatting (Bold, Italic, Underline, Alignments, Fonts, Sizes,Headingsetc.,)
Experiment-2: DemonstrateandPracticeonPageSettings,Margins,Headerand Footer**.Experiment-3:**Demonstrate andPracticeonWordArt,ClipArt.
Experiment-4: Demonstrateand Practiceon TableCreation.

UNIT-4
MS Excel: Create work sheet and work book, Search for data with in aWeb, InsertRows,Columns, Hiding of Rows and Columns, Renaming of Worksheet, Adjust Row Height andColumnWidth, Create Tables.
Experiment-1: CreateaTable,Performsumandaverageofasheet.
Experiment-2: AdjustRowheightandColumnwidthofaTable aspertheRequirements

UNIT-5
MS PowerPoint: Create and Manage Presentation, Slide transition and Animation, WWW,WebBrowser, Virus, Antivirus, Creatingmails.

Experiment-1: CreateaPPTonaTopicofyour Choice.
Experiment-2: Createamailidwith yourRollNumber

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	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	22UPH02	L	T	P	SS	C
Course Name	APPLIED PHYSICS LABORATORY	0	0	3	0	1.5

(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

Course learning 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

1. Apply the various procedures and techniques for the experiments.
2. Use the different measuring devices and meters to record the data with precision.
3. Apply the mathematical concepts/equations to obtain quantitative results.
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

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	I Year – II Semester					
Course Code	22UEC02	L	T	P	SS	C
Course Name	ELECTRONIC WORKSHOP LAB	0	0	3	0	1.5

COURSES OBJECTIVES:

- To study basic electronic components of various types
- To study basics of CRO
- To familiarize the student with the principle operation of Active and Passive elements,
- To provide the students with hands on experience on PCB by using different components.
- To study basics of house wiring and soldering.
- To study basics of PC Hardware i.e Identify the peripherals of a computer, components in a CPU and its functions.

COURSE OUTCOMES:

CO1. At the end of the course the students can able to Measure voltage, frequency and phase of any waveform using CRO.
CO2. Generation of sine, square and triangular waveforms with required frequency and amplitude using function generator.
CO3. Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits
CO4. The students can able to Know about the PC hardware
CO5. The students can able to verify the theorems

Identification of components

I. Laboratory equipment
II. Soldering practice
III. PCB Layout
IV. Testing of Components
V. CRO

I. Identification of components:

- Resistors: Types of Resistors, Value of Resistance using color code, DRBS.
- Capacitors: Types of capacitors, value of capacitance using color code, DCBS.
- Inductors: Types of Inductors, DLB
- Rheostats: Types of Rheostats, Types of potentiometers, Relays.
- Switches: Types of Switches.
- Cables: Types of Cables.
- Types of Instruments used.

Identification of active elements & Testing of Components
(Two Terminal, Three Terminal Devices)

- (SC diode, Zener diode)
- Three Terminal Device: BJT.
- Testing of above components using Multimeter.

II. Laboratory Equipment: & CRO
A) Meters:

- Types of Voltmeters, Types of Ammeters both Analog and Digital.
- Types of Multi meters (Analog & Digital)
- AVO Meters.

B) Laboratory Function Generators and Audio Oscillators.
C) Power Supplies.

D) RF generators.
E) Different Types of Transformers. (Power, AF, RF,etc.)
F) Acquaintance with CRO
G) Finding of Amplitude & frequency of a signal (Measurements on CRO)
III. Soldering practice
Tools kit including soldering iron Tools Kit:
- Insulated nose player
- Insulated cutting player
- Screw driver kit
- Electrical tester
- Soldering iron,Lead,Flex
- Soldering practice with different components

IV. PCB layout and Design.
PCB fabrication of simple circuit with components (Two terminal & Three terminal components)
Materials required, centimeter graph sheets, marker.
V. Verification of Thevenin's Theorem/Maximum power Theorem
VI. Verification of Kirchhoff's Law
VII Study of PC Hardware

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
CO	2	2	2	2	1	2	1	1	2	2	1	1
CO2	2	2	2	2	1	2	1	1	2	2	1	1
CO3	2	2	2	2	1	2	1	1	2	2	1	1
CO4	2	2	2	2	1	2	1	1	2	2	1	1
CO5	2	2	2	2	1	2	1	1	2	2	1	1

Year & Sem	I Year – II Semester					
Course Code	22UEE07	L	T	P	SS	C
Course Name	BASIC ELECTRICAL ENGINEERING LAB	0	0	3	0	1.5

CourseObjectives:

- Todemonstratetheusageofmeasuringequipment
- Totrainthestudentsinsettingupsimplewiringcircuits
- Toimpartmethodsinelectricalmachinewiring

ListofExperiments: (Any Ten Experiments)

1. Magnetization characteristics of D.C. Shunt generator
2. Speed control of D.C. shunt motor.
3. Brake test on DC shunt motor.
4. Swinburne's test on DC machine
5. Load test on DC shunt generator
6. Load test on DC series generator
7. Separation of losses in DC Shunt motor
8. OC & SC tests on single- phase transformer
9. Sumpner's test on single phase transformer
10. Brake test on 3-phase Induction motor.
11. Regulation of alternator by synchronous impedance method.

CO1: DetermineandpredeterminetheperformanceofDCmachinesandtransformers

CO2:ControltheDCshuntmachines

CO3: Computetheperformanceof1-phasetransformer

CO4:Performtestson3-phaseinductionmotor andalternatorto

Determinetheirperformancecharacteristics.

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

Outcomes (PO's) (Strong – 3, Moderate – 2, Weak – 1)

CO – PO MAPPINGS:

	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

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:

- To Enable the student to understand the importance of Constitution
- To understand the structure of Executive, Legislature and Judiciary
- To understand philosophy of Fundamental Rights and Duties
- 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.
- 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.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State Government and its Administration.
3. Get acquainted with Local Administration and Panchayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on Roles and Functioning of Election Commission.

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.

Learning 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

Learning 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

Learning 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

Learning outcomes: -After completion of this unit student will
● Understand the Local Administration
● Compare and contrast District Administration role and importance
● Analyze 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

Learning 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 (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	-	-	-	-	-	2	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	1	-	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	-

Programme	Common to all B.Tech. ECE					
Year & Sem	II Year – I Semester					
Course Code	22UEC03	L	T	P	SS	C
Course Name	Electronic Devices and Circuits	3	1	0	0	3

Course Objectives:

The main objectives of this course are

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

Course Outcomes:

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

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

UNIT-I:

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

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

UNIT-II:

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

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

UNIT-III: Transistor Characteristics:

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

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

UNIT-IV: Transistor Biasing and Thermal Stabilization:

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

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

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

FET: Generalized analysis of small signal model FET, Analysis CS amplifier.

Text Books:

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.LalKishore, BS Publications, Fourth Edition, 2016.

References:

Microelectronic 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

Electronic Devices and Circuits - Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, 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	ECE, CSE, AIML, DS, CS, IOT					
Year & Sem	II Year – I Semester					
Course Code	22UCS05	L	T	P	SS	C
Course Name	PYTHON PROGRAMMING	3	1	0	0	3

Course Objectives:

The Objectives of Python Programming are

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarizedwithgeneralcodingtechniquesandobject-orientedprogramming

Course Outcomes:

CO1: Develop essential programming skills in computer programming concepts like data types, containers
CO2: Apply the basics of programming in the Python language
CO3: Solve coding tasks related conditional execution, loops
CO4: Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming
CO5: Design applications using GUI and Handle Exceptions

UNITI

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables.

Repetition Structures: Introduction, whileloop, forloop, Calculatinga Running Total, Input Validation Loops, Nested Loops

UNIT II

Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration The While Loop

Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods Text Files.

UNIT III

List and Dictionaries: Lists, Defining Simple Functions, Dictionaries

Design with Function: Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Case Study Gathering Information from a File System, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

UNITIV

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), read line() and read lines(), Understanding write functions, write() and write lines(),Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and over loading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support.

Design with Classes: Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism

UNITV

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs , Coding Simple GUI-Based Programs, Other Useful GUIR e sources.

Programming : Introduction to Programming Concepts with Scratch.

Text Books

1) Fundamentals of Python First Programs, Kenneth. A.Lambert, Cengage.
2) Python Programming: A Modern Approach, Vamsi Kurama, Pearson.

Reference Books:

1) Introduction to Python Programming, Gowrishankar.S, Veena A,CRCPress.
2) Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

CO-PO MAPPING

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

Programme	CIVIL, EEE, ECE, CSE, AIML, IOT, CYS, DS					
Year & Sem	II Year – I Semester& 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 const ants 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 line partial differential equations with constant coefficients–non-homogeneous term of the type e^{ax+by}, $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

Applications of PDE: Method of separation of Variables – Solution of One – dimensional Wave, Heat and two – dimensional Laplace equation.

[Test Book (1) : Sections – 17.8, 17.9, 17.10, 17.11, 18.2, 18.5, 18.6, 18.7]

UNIT III Beta and Gamma Functions (10 Hours)

Beta and Gamma functions – Properties – Relation between Beta and Gamma functions – Evaluation of improper integrals.

[Test Book (1) : Sections – 7.14, 7.15, 7.16]

UNIT IV: Vector Calculus (16 Hours)

Vector Differentiation: Gradient – Directional derivative – Divergence – Curl –Scalar Potential

Vector Integration: Line integral – Work done – Area– Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and problems on above theorems.

[Test Book (1) : Sections – 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16]

UNIT-V

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

Numerical Integration - Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method – Runge - Kutta method (fourth order only).

[Test Book (1) : Sections –30.4, 30.6, 30.7, 30.8, 32.2, 32.3, 32.4, 32.5, 32.6, 32.7

Text Books:

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

Reference Books:

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

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

(Strong – 3, Moderate – 2, Weak – 1)

CO – PO and PSO MAPPINGS

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

Year & Sem	II Year – I Semester					
Course Code	22UEC07	L	T	P	SS	C
Course Name	**SIGNALS & SYSTEMS**	3	1	0	0	3

Course Learning Objectives: This course will enable the students to

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

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

CO1: Differentiate the various classifications of signals and systems.
CO2: Analyze the frequency domain representation of signals using Fourier concepts.
CO3: Classify the systems based on their properties and determine the response of LTI Systems.
CO4: Know the sampling process, various types of sampling techniques and Laplace Transforms.
CO5: Apply Z-Transforms to analyze discrete time signals and Systems.

UNIT- I: BASICS OF SIGNALS AND SYSTEMS

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Basic Operations on signals. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function, signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT -II: FOURIER SERIES AND FOURIER TRANSFORM

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

UNIT –III: ANALYSIS OF LINEAR SYSTEMS

Introduction**,** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth,

Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time

CONVOLUTION AND CORRELATION

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

UNIT- IV: LAPLACE TRANSFORMS

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

SAMPLING THEOREM

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

UNIT -V: Z–TRANSFORMS

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

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TEXT BOOKS:

1. Signals, Systems & Communications-B.P. Lathi, BS Publications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S.Willsky and S.H.Nawab, PHI, 2nd Edn, 1997.
3. Signals & Systems – Simon Haykin and VanVeen, Wiley, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Linear Systems and Signals – BP Lathi, Oxford University Press, 2015.
2. Signals and Systems–TK Rawat, Oxford University press, 2011.
3. Signals and Systems - H P HSU, Second Edition, Schaum's outlines.

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

CO – PO MAPPING:

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

Year &Sem	II Year – I Semester					
Course Code	22UEC08	L	T	P	SS	C
Course Name	RANDOM VARIABLES AND STOCHASTIC PROCESS	3	1	0	0	3

Course Learning Objectives: This course will enable the students to

1. To expose the students to the basics of probability theory and random processes essential for their subsequent study of analog and digital communication.
2. To understand the basic concepts of probability, single and multiple random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon
3. To understand the basic concepts of random processes.
4. To understand the concept of correlation and spectral densities.
5. To understand the significance of linear systems with random inputs.

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

CO1: Mathematically model the random phenomena and solve simple probabilistic problems.
CO2: Identify different types of random variables and compute statistical averages of the several random variables.
CO3: Characterize the random processes in the time domain.
CO4: Characterize the random processes in the frequency domain.
CO5: Analyze the LTI systems with random inputs

UNIT- I: PROBABILITY AND RANDOM VARIABLE

Probability: Set theory, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, and Independent Events, Bernoulli's trials.
The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous. Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh Distributions and Conditional Distribution and Conditional Density function and its properties, problems.

UNIT-II OPERATION ON ONE RANDOM VARIABLE-EXPECTATION:

Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance. Mean and Variance of Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh Distributions, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable. Non – monotonic Transformations of Continuous Random Variable.

UNIT-III MULTIPLE RANDOM VARIABLES AND OPERATIONS ON MULTIPLE RANDOM VARIABLES MULTIPLERANDOMVARIABLES: Joint Distribution Function and Properties, Joint density Function and Properties, Marginal Distribution and Density Functions, Conditional Distribution and Density functions, Statistical Independence, Sum of Two Random Variables, Central Limit Theorem: Un equal Distribution, Equal Distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV

RANDOMPROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Non-deterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First - Order Stationary Processes, Second-order and Wide-Sense Stationarity, Nth - order and Strict – Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions.

UNIT-V

RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Density Spectrum: Properties, Relationship between Power Density Spectrum and Auto correlation Function, The Cross-Power Density Spectrum, Properties, and Relationship between Cross-Power Density Spectrum and Cross – Correlation Function.

LINEAR SYSTEMS WITH RANDOM INPUTS: Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean - squared Value of System Response, Auto correlation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output of a linear system.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S. Unnikrisha, PHI, 4th Edition, 2002.
3. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition, 2001.

REFERANCE BOOKS:

1. Schaum's Outline of Probability, Random Variables, and Random Processes, 1997.
2. An Introduction to Random Signals and Communication Theory, B.P.Lathi, International Textbook, 1968.
3. Probability Theory and Random Processes, P.Ramesh Babu, McGrawHill, 2015.

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

Year & Sem	II Year – ISemester					
Course Code	22UCS07	L	T	P	SS	C
Course Name	PYTHON PROGRAMMING LAB	0	0	3	0	1.5

Course Objectives:

The Objectives of Python Programming are

- To learn about Python programming language syntax, semantics, and the runtime environment.
- To be familiarized with universal computer programming concepts like data types, containers.
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object - oriented programming

Course Outcomes:

CO1: Develop essential programming skills in computer programming concepts like data types, containers
CO2: Apply the basics of programming in the Python language
CO3: Solve coding tasks related conditional execution, loops
CO4: Solve coding tasks related to the fundamental notions and techniques used in Object - oriented programming

List of Experiments:

1) Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a Kilogram.
2) Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3) Write a program that uses a for loop to print the numbers 8, 11,14, 17, 20, .. . ,83, 86, 89.
4) Write a program that asks the user for their name and how many times to print it. The program should print out the user's name the specified number of times.
5) Use a for loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

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*
**
***
****
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6) Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
7) Write a program that asks the user for two numbers and prints Close if the numbers are within .001 of each other and Not close otherwise.
8) Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
9) Write a program that asks the user to enter two strings of the same length. The program

should then check to see if the strings are of the same length. If they are not the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters abcde and ABCDE the program should print out AaBbCcDdEe.

10) Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be 1,000,000.
11) In algebraic expressions, the symbol for multiplication is often left out as in 3x+4y or 3(x+5). Computers prefer those expressions to include the multiplication symbol, like 3*x+4*y or 3*(x+5). Write a program that asks the user for an algebraic expression and then inserts multiplication symbols where appropriate.
12) Write a program that generates a list of 20 random numbers between 1 and 100.
    (a) Print the list.
    (b) Print the average of the elements in the list.
    (c) Print the largest and smallest values in the list.
    (d) Print the second largest and second smallest entries in the list
    (e) Print how many even numbers are in the list.
13) Write a program that asks the user for an integer and creates a list that consists of the factors of that integer.
14) Write a program that generates 100 random integers that are either 0 or 1. Then find the longest run of zeros, the largest number of zeros in a row. For instance, the longest run of zeros in [1,0,1,1,0,0,0,0,1,0,0] is 4.
15) Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].
16) Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimeters, centimeters, meters, or kilometers. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements, it is much shorter with lists and it is also easier to add new conversions if you use lists.
17) Write a function called sum digits that is given an integer num and returns the sum of the digits of num.
18) Write a function called first diff that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return-1.
19) Write a function called number of factors that takes an integer and returns how many factors the number has.
20) Write a function called is sorted that is given a list and returns True if the list is sorted and False otherwise.
21) Write a function called root that is given a number x and an integer n and returns $x^{1/n}$. In the function definition, set the default value of n to 2.
22) Write a function called primes that is given a number n and returns a list of the first n primes. Let the default value of n be100.

Write a function called merge that takes two already sorted lists of possibly different lengths, and merges them into a single sorted list.

(a) Do this using the sort method
(b) Do this without using the sort method.

23) Write a program that asks the user for a word and finds all the smaller words that can be made from the letters of that word. The number of occurrences of a letter in a smaller word can't exceed the number of occurrences of the letter in these user's word.

24) Write a program that reads a file consisting of email addresses, each on its own line. Your program should print out a string consisting of those email addresses separated by semicolons.
25) Write a program that reads a list of temperatures from a file called temps.txt, converts those temperatures to Fahrenheit, and writes the results to a file called ftemps.txt.
26) Write a class called Product. The class should have fields called name, amount, and price, holding the product's name, the number of items of that product in stock, and the regular price of the product. There should be a method get price that receives the number of items to be bought and returns a the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called make purchase that receives the number of items to be bought and decreases amount by that much.
27) Write a class called Time whose only field is a time in seconds. It should have a method called *convert_to_minutes* that returns a string of minutes and seconds formatted as in the following example: if seconds is 230, the method should return '5:50'. It should also have a method called *convert_to_hours* that returns a string of hours, minutes, and seconds formatted analogously to the previous method.
28) Write a class called Converter. The user will pass a length and a unit when declaring an object from the class—for example, c = Converter(9,'inches'). The possible units are inches, feet, yards, miles, kilometers, meters, centimeters, and millimeters. For each of these units there should be a method that returns the length converted into those units. For example, using the Converter object created above, the user could call c.feet() and should get 0.75 as the result.
29) Write a Python class to implement pow(x,n).
30) Write a Python class to reverse a string word by word.
31) Write a program that opens a file dialog that allows you to select a text file. The
32) Program then displays the contents of the file in a textbox.
33) Write a program to demonstrate Try/except/else.
34) Write a program to demonstrate try/finally and with/as.

CO-PO MAPPING

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2							1
CO2	2	2	1	1	2							1
CO3	2	2	1	1	2							1
CO4	3	2	1	1	2							1

Year & Sem	II Year – I Semester					
Course Code	22UEC04	L	T	P	SS	C
Course Name	**ELECTRONIC DEVICES 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	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 – I Semester					
Course Code	22UEN06	L	T	P	C	L
Course Name	SOFT SKILLS-I (SKILL ORIENTED COURSE)	0	0	4	2	0

Course Outcomes:

At the end of the Course, the Student will be able to:

CO1 : Learn and use new vocabulary.
CO2 : Use language fluently, accurately and appropriately in different situations.
CO3 : Use their skills of listening comprehension to communicate effectively in cross-cultural contexts.
CO4 : Developing the overall personality
CO5 : Learn writing skills for different situations.

1. Vocabulary building, Synonyms and Antonyms, One- word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.
2. Inter-personal Communication - Starting a Conversation – Responding Appropriately and Relevantly – Role Play in Different Situations
3. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English.
4. Personality Development : Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking.
5. Writing Skills–Letter writing, Email etiquette; Essays for competitive examinations, Analyzing news paper articles.

REFERENCES:

1. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Ltd.2005.
2. Andrea J. Rutherford, "Basic Communication Skills for Technology", 2nd Edition, Pearson Education, 2007.
3. Meenakshi Raman & Sangeeta Sharma, "Technical Communication", Oxford University Press, 2011.
4. DELTA's key to the Next Generation TOEFL Test: "Advanced Skill Practice," New Age

Mapping of Course Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	1	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-

Year & Sem	II Year – II Semester					
Course Code	22UEC09	L	T	P	SS	C
Course Name	ELECTRONIC CIRCUIT ANALYSIS	3	1	0	0	3

Course Learning Objectives: This course will enable the students to

- To learn hybrid-pi parameters at high frequency and compare with low frequency parameters.
- Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltage gain.
- Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
- Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillator circuits.
- Compare and analyze different Power amplifiers and tuned amplifier circuits.

Course Outcomes:

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

CO1: Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
CO2: Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT.
CO3: Know the classification of the power and tuned amplifiers and their analysis with performance comparison
CO4: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
CO5: Know the classification of the power and tuned amplifiers and their analysis with performance comparison

UNIT- I: Small Signal High Frequency Transistor Amplifier models:

BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, validity of hybrid π model, determination of high-frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.
FET: Analysis of common Source Amplifier circuits at high frequencies

UNIT -II
Multistage Amplifiers: Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascade amplifier, Boot-strap emitter follower.

UNIT –III

Feedback Amplifiers: Concepts of feedback, Classification of feedback amplifiers, General characteristics of Negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations**.**

UNIT- IV

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC- phase shift and Wien bridge oscillators with BJT and FET and their analysis, generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT, Frequency and amplitude stability of oscillators, Crystal Oscillator.

UNIT -V

Power Amplifier: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class C Amplifiers.

Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

TEXT BOOKS:

1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw-Hill, 1972.
2. Electronic Devices and Circuits Theory –Robert L.Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition, 2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications,2006.

REFERENCE BOOKS:

1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Micro electronic Circuits - Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition, 2011.
3. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.

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

CO – PO MAPPING:

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

Programme	ECE, CSE, AIML, DS, CS, IOT					
Year & Sem	II 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

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

Course Outcomes:

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

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

UNIT - I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching – Linear search, Binary search, Fibonacci search.

Sorting – Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), 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.

UNITIV

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

UNITV

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, 2nd ed, Mark Allen Weiss.

Reference Books:

1) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
2) Data Structures: A Pseudo Code 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

CO-PO MAPPING

Course	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

Programme	ECE					
Year & Sem	II Year – II Semester					
Course Code	22UEC10	L	T	P	SS	C
Course Name	ANALOG COMMUNICATIONS	3	1	0	0	3

Course Objectives:

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

Course Outcomes:

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

CO1: Acquired knowledge on Analog communication system and elements
CO2: Differentiate various Amplitude modulation and demodulation schemes and their spectral characteristics
CO3: Differentiate various Angle modulation and demodulation schemes and their spectral characteristics
CO4: Analyze various functional blocks of radio transmitters and receivers
CO5: Analyze noise characteristics of various analog modulation methods.
Design pulse analog systems for various modulation techniques

.

UNIT-I AMPLITUDE MODULATION

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

UNIT-II DSB & SSB MODULATION

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

UNIT-III ANGLE MODULATION

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct & Indirect FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

UNIT IV TRANSMITTERS & RECEIVERS

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

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

UNIT V NOISE

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

PULSE MODULATION

Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation &demodulation of PWM, PPM, Generation and demodulation of PPM, comparison of TDM and FDM

Text Books:

1) Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 3rd Edition, 2007.
2) Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Edition, 2007
3) Modern Digital and Analog Communication Systems –B.P.Lathi, ZhiDing, Hari Mohan Gupta, Oxford University Press,4th Edition,2017

Reference Books:

1. Essentials of Analog Communications – Dr Sanjay Sharma, Narosa Book Distributors Pvt Ltd.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
4. Electronic Communication systems – Tomasi, Pearson, fourth Edition,2007.

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

CO – PO and PSO MAPPINGS

Mapping Course Outcomes with Programme Outcomes

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

Year &Sem	II Year – II Semester					
Course Code	22UEC11	L	T	P	SS	C
Course Name	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES	3	1	0	0	3

Course Learning Objectives: This course will enable the students to

- To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.
- To impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications.
- To impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations.
- Model and design the transmission lines at high frequencies.
- To apply Smith chart, use for solution of transmission line problems and impedance matching.

Course Outcomes:

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

CO1: Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential.
CO2: Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential.
CO3: Apply the Maxwell equations to analyze the time varying behavior of EM waves. Gain the knowledge in uniform plane wave concept and characteristics of uniform plane.
CO4: Wave in various media and to calculate Brewster angle, critical angle, and total internal reflection.
CO5: Understand the concepts of transmission lines and its applications. And to derive the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc.

UNIT-I Electrostatics

Coulomb's Law, Electric Field Intensity, Electric Field Intensity due to line and a surface charge, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Relaxation Time, Poisson's, and Laplace's Equations.

UNIT -II: **Magnetostatics**

Introduction – Biot-Savart Law, Ampere's Circuital Law, and Applications, point form of Ampere's circuital law, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Magnetic Energy.

Maxwell's Equations (Time Varying Fields): Faraday's Law and Lenz's law, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Maxwell's Equations for free space and good conductor, Conditions at a Boundary Surface, Illustrative Problems.

UNIT –III: **EM Wave Characteristics**

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Wave Propagation in Good Conductors and Good Dielectrics, skin depth, Polarization & Types

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Pointing Vector and Pointing Theorem.

UNIT- IV: Transmission Lines-I

Types, Transmission Line Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concept, Lossless /Low Loss Characterization, distortion less lines, Condition for Distortion less and Minimum Attenuation.

UNIT -V: Transmission Lines -II

Loading - Types of Loading, Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Construction and Applications.

TEXT BOOKS:

1. Matthew N.O. Sadiku - Elements of Electromagnetics, Oxford University Press, 3rd ed., 2001.
2. E.C. Jordan and K.G. Balmain- Electromagnetic Waves and Radiating Systems, PHI, 2nd Edition, 2000.
3. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetics, Mc Graw Hill Education, 7th Edition, 2006.
4. Umesh Sinha, Transmission Lines and Networks, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

REFERENCE BOOKS:

1. GSN Raju- Electromagnetic Fields and Wave Theory, Pearson Education 2006
2. Nathan Ida -Engineering Electromagnetics, Springer (India) Private Limited, New Delhi, 2nd Edition, 2005.

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	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	2	-	-	-	-	-	-
CO5	3	3	3	-	-	2	-	-	-	-	-	-

Year & Sem	II Year – II Semester					
Course Code	22UEC12	L	T	P	SS	C
Course Name	**LINEAR CONTROL SYSTEMS**	3	1	0	0	3

Course Learning Objectives: This course will enable the students to

- To teach fundamental concepts of Control systems and mathematical modelling of the system.
- To teach the concepts of time response and frequency response analysis of Control Systems.
- To teach the concepts of time response and frequency response analysis of Control Systems.
- To teach concepts of controllers and compensators
- To design various applications of control systems

Course Outcomes:

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

CO1: Students will be able to understand the basic concepts of control system and identify control systems in real life applications.
CO2: Students will be able to derive the mathematical model of different types of control systems and represent them in various forms.
CO3: Students will be able to analyze systems using time domain analysis techniques**.**
CO4: Students will be able to apply concepts of frequency domain techniques in stability analysis of control systems
CO5: Students will be able to create state variable models of systems and analyze their controllability, observability and time response.

UNIT- I:

Concepts of control systems: Open loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back characteristics, Effects of feedback.

Mathematical models of physical systems -Differential equations, Transfer functions of translational and rotational mechanical systems,

UNIT -II:

Control systems and components: DC servomotor (Armature controlled and field controlled) with necessary derivation for transfer function, AC Servomotor and its transfer function, Block diagram algebra, Signal flow graphs with illustrative examples.

Time response analysis: Time response analysis standard test signals, Time response of first and second order systems, steady state errors and error constants, Effect of adding a zero to a system, Design specifications of second order systems, Performance indices.

UNIT –III:

Concepts of stability and algebraic criteria: The Concept of stability, Necessary conditions for stability, Routh-Hurwitz stability criterion, Relative stability analysis,

The root locus technique: Introduction, The root locus concepts, Construction of root loci

UNIT- IV:

Frequency response analysis: Introduction, Correlation between time and frequency response, Bode Plots, Polar Plots, Nyquist Stability criterion

UNIT –V

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency domain, PID Controllers**.**

State space analysis of continuous systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- solving the time invariant state equations- State transition matrix and it's properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.
2. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.

REFERENCE BOOKS:

1. Modern Control Engineering–by Katsuhiko Ogata – Pearson Publications, 5th edition,2015.
2. Control Systems by A. Nagoorkani, RBA publications, 3 edition, 2017.
3. Control Systems by A. Anandkumar, PHI, 2 Edition, 2014.

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

CO – PO MAPPING:

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

Programme	**Common to all B.Tech. ECE**					
Year & Sem	**II Year – II Semester**					
Course Code	22UEC13	**L**	**T**	**P**	**SS**	**C**
Course Name	**ELECTRONIC CIRCUIT ANALYSIS LAB**	**0**	**0**	**3**	**0**	**1.5**

Note: The students are required to design the circuit and perform the simulation using Multisim / Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

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

1. Determination of Ft of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley / Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Boots trapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

Equipment required: Software:

i. Multisim / Equivalent Industrial Standard Licensed simulation software tool.
ii. Computer Systems with required specifications

Hardware Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscillo scopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

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	22UEC14	L	T	P	SS	C
Course Name	ANALOG COMMUNICATIONS LABORATORY	0	0	3	0	1.5

List of Experiments: (Twelve experiments to be done- The students have to calculate the relevant parameters) – (A. Hardware, B. MATLAB Simulink or MATLAB Communication tool box)

List of Experiments

1) Amplitude Modulation - Modulation & Demodulation
2) AM – DSBSC - Modulation & Demodulation
3) Spectrum Analysis of Modulated signal using Spectrum Analyzer
4) Diode Detector
5) Pre-emphasis & De-emphasis
6) Frequency Modulation–Modulation & Demodulation
7) AGC Circuits
8) Verification of Sampling Theorem
9) Pulse Amplitude Modulation & Demodulation
10) PWM, PPM–Modulation & Demodulation
11) PLLIC-565 as FM demodulator
12) Radio receiver characteristics
13) Radio Receiver/TV Receiver Demokits or Trainees.

Software required:

i) Computer Systems with latest specifications
ii) Connected in LAN (Optional)
iii) Operating system (Windows/Linux software)
iv) Simulations software (Simulink & MATLAB)

Equipment:

1. RPS - 0 –30V
2. CRO - 0– 20M Hz.
3. Function Generators - 0 – 1 MHz
4. Components and Bread boards
5. Multimeters and other meters
6. Spectrum Analyzer

Course learning objectives:

1. To Verify the working of different modulation and demodulation techniques.
2. To analyze the operation of different modulation techniques for given input data.
3. To Design the different communication circuits and verify the working of the circuits.

Course Outcomes (COs):
At the end of the course, the student will be able to

1. Verify the working of different modulation and demodulation techniques
2. Analyze the operation of different modulation techniques for given input data.
3. Design the different communication circuits and verify the working of the circuits

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	-	-	-	3	3	2	-
CO2	-	3	-	-	-	-	-	-	3	3	2	-
CO3	-	2	3	-	-	-	-	-	3	1	2	-

Year & Sem	II Year – II Semester					
Course Code	22UCS06	L	T	P	SS	C
Course Name	DATA STRUCTURES LABORATORY	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 Linear search for a Key value in a given list.
b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise-2 (Sorting-I)

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

Exercise-3 (Sorting-II)

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

Exercise-4 (Singly Linked List)

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

Exercise-5 (Stack)

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

Exercise-6 (Queue)

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

Exercise-7 (Binary Tree)

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

Exercise-8 (Binary Search Tree)

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

CO-PO MAPPING

Course	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	II Year – II Semester					
Course Code	22UEN07	L	T	P	C	L
Course Name	SOFT SKILLS-II (SKILL ORIENTED COURSE)	0	0	4	2	0

Course Outcomes:

At the end of the Course, the Student will be able to:

CO1: Develop language competency.
CO2: Write resumes.
CO3: Exhibit interview skills.
CO4: Use language fluently, accurately and appropriately in Group Discussions
CO5: Use their skills of comprehension to communicate effectively in cross-cultural contexts.

1. Language competency: Para jumbled, Analogy, sentence equivalence, critical reasoning.
2. Resume writing –structure and presentation, planning, defining the career objective.
3. Interview Skills– concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
4. Group Discussion–dynamics of group discussion, Lateral thinking, Brainstorming.
5. Cross-Cultural Communication / Non-Verbal Communication, Problems of Language, Lack of Language equivalency/ difficulties in using English.

REFERENCES:

1. M. Ashraf Rizvi, "Effective Technical Communication", Tata McGraw - Hill Publishing Company Ltd.2005.
2. Andrea J. Rutherford, "Basic Communication Skills for Technology", 2nd Edition, Pearson Education, 2007.
3. Meenakshi Raman & Sangeeta Sharma, "Technical Communication", Oxford University Press, 2011.
4. DELTA's key to the Next Generation TOEFL Test: "Advanced Skill Practice," New Age

Mapping of Course Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-		-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-

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

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:

1. Understand the significance of Indian Traditional Knowledge
2. Classify the Indian Traditional Knowledge
3. Compare Modern Science with Indian Traditional Knowledge system.
4. Analyze the role of Government in protecting the Traditional Knowledge
5. 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 & TharkaShastra).

Unit III

Modern Science and Indian Knowledge System - Indigenous Knowledge, Characteristics-Yoga and Holistic Healthcare-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, Nruthya Yevam Sahithya

Reference 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, Pratibha Prakashan 2012.
3. Sivaramakrishnan(Ed.),Cultural Heritage of India-course material, Bharatiya Vidya
4. SwamiJi tatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
5. Yoga Sutra of Patanjali, Rama Krishna Mission, Kolkata.
6. Pramod Chandra, India Arts, Howard Univ.Press, 1983.
7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

Web Resources:

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

Mapping of Course Outcome

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-											
CO2												
CO3												
CO4												
CO5								1				
CO6												