# KKR & KSR
# INSTITUTE OF TECHNOLOGY AND SCIENCES (AUTONOMOUS)

Accredited by NBA & NAAC with Grade "A" and Affiliated to JNTUK-Kakinada
Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh 522017


## BACHELOR OF TECHNOLOGY (B. Tech)

## ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE

## R-20 REGULATION
### (CHOICE BASED CREDIT SYSTEM)

(Applicable from the batches admitted in AY: 2020-2021
& Lateral Entry AY: 2021-2022)

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

### SEMESTER-I

| S. No. | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20SH1T01 | Communicative English | 3 | 0 | 0 | 3 |
| 2 | 20SH1T02 | Applied Physics | 3 | 0 | 0 | 3 |
| 3 | 20SH1T07 | Linear Algebra and Vector Calculus | 3 | 0 | 0 | 3 |
| 4 | 20EE1T01 | Electrical Installation and Electronics Engineering Practice | 2 | 0 | 2 | 3 |
| 5 | 20CS1T01 | Problem Solving and Programming Using C | 3 | 0 | 0 | 3 |
| 6 | 20GE1M01 | Environmental Science | 2 | 0 | 0 | --- |
| **PRACTICAL** | | | | | | |
| 7 | 20SH1L01 | English Communicative Skills Lab | 0 | 0 | 3 | 1.5 |
| 8 | 20SH1L02 | Applied Physics Lab | 0 | 0 | 3 | 1.5 |
| 9 | 20CS1L01 | Problem Solving and Programming Using C Lab | 0 | 0 | 3 | 1.5 |
| | | | | | **Total Credits** | **19.5** |

**Theory: BSC-2, HSMC-1, ESC-2 Practical: BSC-1, HSMC-1, ESC-1**

### SEMESTER-II

| S. No. | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20SH2T04 | Applied Chemistry | 3 | 0 | 0 | 3 |
| 2 | 20SH2T06 | Differential Equations | 3 | 0 | 0 | 3 |
| 3 | 20ME2T01 | Engineering Graphics | 1 | 0 | 4 | 3 |
| 4 | 20CS2T01 | Python Programming | 3 | 0 | 0 | 3 |
| 5 | 20EE2T01 | Network Analysis | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 6 | 20SH2L04 | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 7 | 20CS2L01 | Python Programming Lab | 0 | 0 | 3 | 1.5 |
| 8 | 20CS2L02 | IT Workshop | 0 | 0 | 3 | 1.5 |
| | | | | | **Total Credits** | **19.5** |

**Theory: BSC-2, ESC-3 Practical: BSC-1, ESC-2**

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

### SEMESTER-III

| S. No. | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20SH3T03 | Numerical Methods & Transformations | 3 | 0 | 0 | 3 |
| 2 | 20EC3T01 | Electronic Devices and Circuits | 2 | 1 | 0 | 3 |
| 3 | 20EC3T02 | Digital System Design | 2 | 1 | 0 | 3 |
| 4 | 20EC3T03 | Signals and Systems | 3 | 0 | 0 | 3 |
| 5 | 20SH3T01 | Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3 |
| 6 | 20GE3M01 | Constitution of India | 2 | 0 | 0 | 0 |
| **PRACTICAL** | | | | | | |
| 7 | 20EC3L01 | Electronic Devices and Circuits Lab | 0 | 0 | 3 | 1.5 |
| 8 | 20EC3L02 | Digital System Design Lab | 0 | 0 | 3 | 1.5 |
| 9 | 20CS3L03 | OOP's Through C++ Lab | 0 | 0 | 3 | 1.5 |
| 10 | 20EC3S01 | Skill oriented Course – I<br>**(Basic level skill Oriented courses-I)** | 1 | 0 | 2 | 2.0 |
| | | | | | **Total Credits** | **21.5** |

**Theory: BSC-1, PCC-4 Practical: PCC-3, SC-1, MC-1**

### SEMESTER-IV

| S. No. | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | 20EC4T01 | Electronic Circuit Analysis | 3 | 0 | 0 | 3 |
| 2 | 20EC4T02 | Analog Communication | 3 | 0 | 0 | 3 |
| 3 | 20EC4T03 | Electro Magnetic Waves and Transmission Lines | 3 | 0 | 0 | 3 |
| 4 | 20EE4T02 | Control Systems | 2 | 1 | 0 | 3 |
| 5 | 20CS4T04 | Data Structures | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 6 | 20EC4L01 | Electronic Circuit Analysis Lab | 0 | 0 | 3 | 1.5 |
| 7 | 20EC4L02 | Analog Communication Lab | 0 | 0 | 3 | 1.5 |
| 8 | 20CS4L04 | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | 20EC4S01 | Skill Oriented Course - II<br>**(Basic level skill Oriented courses-II)** | 1 | 0 | 2 | 2.0 |
| | | | | | **Total Credits** | **21.5** |

**Theory: ESC-1, PCC-3, HSMC-1 Practical: ESC-1, PCC-2, SC-1**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH1T01 | Communicative English | 3 | 0 | 0 | 3 |

**INTRODUCTION:**

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from learning about the language to using the language. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : recall life in one's past which had fine balancing act

CO2 : decide the qualities required to take up a promising career.

CO3 : evaluate the obstacles hinder of student's progress and find the ways to overcome them

CO4 : explain the environment activism and empowerment of women.

CO5 : interpret the efforts of successful persons to keep idealistic approach in achieving goals.

**SYLLABUS:**

**UNIT-I : A Drawer full of happiness**

**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, Study and interests. Self-introduction and introduce others.

**Vocabulary:** Technical vocabulary from a cross technical branches, GRE Vocabulary (Antonyms and Synonyms, Word applications).

**Grammar:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns- Countable and uncountable; singular and plural, basic sentence structures; simple question form–'wh' questions; word order in sentences.

**Writing:** Note Making and Note Taking.

**UNIT-II : Nehru's letter to daughter Indira on her Birthday**

**Speaking:** Discussion in pairs, small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings.

**Vocabulary:** Technical vocabulary from across technical branches. GRE Vocabulary, Analogies (Antonyms and Synonyms, Word applications)

**Grammar:** Use of articles and zero article; prepositions.

**Writing:** Resume, Cover Letter.

**Employability Skills:** Time Management

**UNIT-III : Stephen Hawking-Positivity 'Benchmark'**

**Speaking:** Discussing specific topics in pairs or in small groups and reporting what is discussed. Functional English: Complaining and Apologizing.

**Reading:** Reading a text in detail by making basic inferences-recognizing and interpreting Specific context clues; strategies to use text clues for comprehension. Critical reading.

**Vocabulary:** Technical vocabulary from a cross technical branches, GRE Vocabulary (Antonyms and Synonyms, Word applications) Association, sequencing of words- Grammar: Verbs–Tenses; subject-verb agreement.

**Writing:** Letter Writing: -Formal, Business, Editorial, Complaints, Applications, Permissions.

**Employability Skills:** Leadership skills

**UNIT-IV : Like a Tree, Unbowed: Wangari Maathai-biography**

**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicative process or display complicated data.

**Reading for Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

**Vocabulary:** Technical vocabulary from across technical branches, GRE Vocabulary, (Antonyms and Synonyms, Word applications) Cloze Encounters.

**Writing:** Essay Writings: - Paragraph Writing, Precis Writing,

**Employability Skills:** Management skills.

**UNIT-V : Stay Hungry-Stay Foolish**

**Reading:** RAP Strategy Intensive reading and Extensive reading techniques.

**Reading for Writing:** Writing academic proposals- writing research articles: format and style. Vocabulary: Technical vocabulary from across technical branches, GRE Vocabulary (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

**Grammar:** Editing short texts–identifying and correcting common errors in grammar and usage

(Articles, prepositions, tenses, subject verb agreement)

**Writing:** E- Mail, Reports, Reporting to media.

**Employability Skills:** Creative Thinking

**TEXTBOOKS:**

1. "Infotech English", Maruthi Publications.

**REFERENCEBOOKS:**

1. Bailey, Stephen. Academic writing: A hand book for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. SkillfulLevel2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin.Cambridge Academic English (B2). CUP,2012.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH1T02 | Applied Physics | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : explain the need of coherent sources and the conditions for sustained interference.

CO2 : understand the basic concepts of laser light sources

CO3 : analyze the physical significance of wave function.

CO4 : identify the type of semiconductor using hall effect.

CO5 : apply the concept of magnetism to magnetic devices

**SYLLABUS:**

**UNIT-I : Wave Optics**

**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) – 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-II : Lasers & Fiber Optics**

**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-III : Magnetism & Dielectrics**

**Magnetism**: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Bohr magneton- Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism – Hysteresis – soft and hard

magnetic materials – applications of Ferromagnetic material.

**Dielectrics:** Introduction - Dielectric Polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (Quantitative), Orientation. Polarizations (Qualitative) - Lorentz Internal field-Claussius –Mossotti's equation- Frequency dependence of polarization - Applications of dielectrics.

**UNIT-IV : Quantum Mechanics, Free Electron Theory & Band Theory of Solids**

**Introduction** – matter waves – de Broglie's hypothesis, Heisenberg's Uncertainty Principle Schrödinger time independent and time dependent wave equations – physical significance of Schrödinger wave function – Particle in a potential box (determination of energy).

**Free Electron Theory:** Introduction - 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:** Introduction - Bloch theorem, krong-Penney model, E vs K diagram, effective mass of electron, classification of c solids –concept of hole

**UNIT-V : SEMICONDUCTOR PHYSICS**

Introduction – Intrinsic semiconductors - density of charge carriers – Electrical conductivity - Fermi level - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Drift and Diffusion currents - Einstein's equation. Hall effect- Hall coefficient - Applications of Hall effect.

**TEXT BOOKS:**

1. B. K. Pandey, S. Chaturvedi., "Engineering Physics" - Cengage Publications, 2012
2. M.N. Avadhanulu, P.G.Kshirsagar., "A Text book of Engineering Physics" - S.Chand, 2017.
3. D.K.Bhattacharya and Poonam Tandon., "Engineering Physics", Oxford press (2015).
4. R.K Gaur. and S.L Gupta., "Engineering Physics" - Dhanpat Rai publishers, 2012.

**REFERENCE BOOKS:**

1. M.R.Srinivasan, "Engineering Physics", New Age international publishers (2009).
2. Ajoy Ghatak "Optics", 6th Edition McGraw Hill Education, 2017.
3. A.J.Dekker "Solid State Physics", Mc Millan Publishers (2011).

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH1T07 | Linear Algebra and Vector Calculus | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : solve simultaneous linear equations numerically using various matrix methods

CO2 : find the eigen values and eigen vectors of a given matrix and nature of quadratic form

CO3 : determine double integral over a region and triple integral over a volume

CO4 : calculate gradient of a scalar function, divergence and curl of a vector function

CO5 : determine line, surface and volume integrals and apply green, stokes and gauss divergence theorems to calculate line, surface and volume integrals

**SYLLABUS:**

**UNIT-I : Linear systems of equations**

Rank - Echelon form – Normal form – Solving system of homogeneous and Non– Homogeneous equations – Gauss elimination – Gauss Jordon. Applications: Finding the current in electrical circuits.

**UNIT-II : Eigen values - Eigen vectors and Quadratic forms**

Eigen values – Eigen vectors– Properties (without proof) – Clayey-Hamilton theorem (Without of proof) – Inverse and powers of a matrix by using Clayey-Hamilton theorem– Diagonalisation – Reduction of quadratic form to canonical form by Orthogonalisation – Rank – Positive, negative and semi definite – Index – Signature

**UNIT-III : Multiple integrals**

Double and Triple integrals – Change of order of integration – Change of variables. Applications: Finding Areas.

**UNIT-IV : Vector Differentiation**

Gradient– Directional derivative – Divergence – Curl – Scalar Potential – Laplacian and second order operators -Vector identities

**UNIT-V : Vector Integration**

Line integral – Work done – Potential function – Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof).

**TEXT BOOKS:**

1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE1T01 | Electrical Installation and Electronics Engineering Practice | 2 | 0 | 2 | 3 |

**PART A: Electrical Installation**

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : realize the limitations, tolerances, electrical tools, safety aspects of electrical systems and wiring

CO2 : select wires/cables and other accessories used in different types of wiring

CO3 : make simple lighting and power circuits

CO4 : initialize backup power supply system

**SYLLABUS:**

**MODULE-I : Electrical Safety, Symbols & Tools**

**Electrical safety:** Safety rules - Safety signs - Hazards - Fire - Types – Extinguishers- Rescue operations - First aid treatment - Artificial respiration- Disposal of waste material - Personal Protective Equipment- Guidelines for cleanliness of workshop and maintenance.

**Symbols:** Study & identification of electrical circuit symbols – sources, switches, fuses, R, L (coils), C (condensers), various transformers (CT & PT's) - study of various electrical meters with symbolic representations.

**Tools:** Study of various electrical tools like tester, screw driver, connector screw driver, cutting pliers, combination pliers, Firmer chisel, Electrician knife, soldering rods, hammers, try square and other tools, Trade hand tools - specification – standards (National Electrical Code).

**Experiment (s):**

1. Study of various electrical tools and symbols

**MODULE-II : Electrical wiring - components & its accessories**

**Identification & selecting the wiring materials:** conducting, insulating and semiconductor materials - wiring –PVC casing capping wiring – conduit wiring- types of conduits - concealed wiring - Advantages & dis – advantages - wiring colour codes.

**Wiring Accessories:** various Switches – (surface, flush, ceiling, push pull, bed switches) – sockets –one-way, two-way, intermediate switch- Holders –pendant, batten holder, socket outlet/plug - link clips, nails, insulation tape- Main switch /main MCB (miniature circuit breaker) – MCCB (molded

case circuit breaker) –ELCB (earth leakage circuit breaker) – RCCB (residual current circuit breaker) – differences & it's –uses.

**Experiment (s):**

1. Identify different types of cables/wires and switches, fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage

**MODULE-III : Simple lighting and power circuits, Backup power supply system**

Connection of lamp using single and two switches- light / fan circuit using two way / three-way control (stair case wiring) - ICTP (Iron clad triple pole) switch - Fixing wiring accessories on board –wiring of power distribution arrangement using single MCB distribution board with ELCB, Main switch and energy. Earthing – Types of Batteries, Important Characteristics of Batteries. Elementary Calculations for Energy Consumption, Battery Backup –Inverter / UPS (uninterrupted power supplies)

**Experiment (s):**

1. Wiring of light/fan circuit using two way/ three-way control (stair case wiring)
2. Go-down wiring/Tunnel wiring
3. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and energy.
4. Wiring of backup power supply including inverter, battery and load for domestic

**LIST OF THE EXPERIMENTS**

1. Study of various electrical tools and symbols
2. Identify different types of cables/wires and switches, fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage
3. Wiring of light/fan circuit using two way/ three-way control (stair case wiring)
4. Go-down wiring/Tunnel wiring
5. Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and energy.
6. Wiring of backup power supply including inverter, battery and load for domestic

**REFERENCES**

1. Brian Scaddan, IET Wiring Regulations: Electric Wiring for Domestic Installers, 18th ed., Routledge (Taylor & Francis Group), 2018.

2. Electrician- Trade theory (Volume I of II)- NSQF (level - 5), 1st ed., National instructional media institute, 2018.

**PART B: Electronics Engineering Practice**

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : memorize various passive components

CO2 : classify various active elements

CO3 : operate various measuring devices

CO4 : test the working of the device by soldering

CO5 : examine various outputs using CRO

**List of the Experiments**

**1. Identification of Passive Components**

Resistors: - Types of Resistors, Value of Resistance using color code, DRBS.

Capacitors: - Types of capacitors, value of capacitance, DCBS.

Inductors: - Types of Inductors, DLB

Rheostats: - Types of Rheostats, Types of potentiometers, Relays.

Switches: - Types of Switches.

Cables: Types of Cables.

**2. Identification of Active elements**

Two Terminal Devices: SC diode, Zener diode, DIAC

Three Terminal Devices: BJT, UJT, SCR, FET, MOSFET, TRIAC.

Digital and Analog ICs (TO and Flat packages), IC regulators types.

**3. Practicing Laboratory Equipment**

A. Meters: -
Types of Voltmeters, Ammeters (Analog & Digital).
Types of Multi meters (Analog & Digital)
B. Laboratory Function Generators and Oscillators.
C. Power Supplies.
D. RF generators.
E. Different Types of Transformers (Power, AF, RF etc).

**4. Soldering practice**

Requirement:
Tools kit including soldering iron Tools Kit
Insulated nose player
Insulated cutting player
Screw driver kit
Electrical tester

Soldering iron, Lead, Flex

5. **PCB layout and Design.**
   Materials required, Centimeter graph sheets, Marker.

6. **Testing of Components.**
   Active and Passive Components

7. **CRO**
   Acquaintance with CRO and Measurements on CRO.

**TEXT BOOKS:**

5. J. Millman, C. Halkias, Electronic Devices and Circuits, 2nd ed., Tata Mc-Graw-Hill, 2018.
6. K. Lal Kishore, Electronic Measurements and Instrumentation, Pearson Education 2010.
7. H. (Ted) Smith, Quality hand soldering and circuit board repair, 6th ed., Cengage Learning, 2012.

**REFERENCE BOOKS:**

4. H. S. Kalsi, Electronic Instrumentation, 2nd ed., Mc-Graw-Hill Education, 2nd Edition 2004.
5. R S Khandpur, Printed Circuit Boards: Design – Fabrication, 1st ed., McGraw Hill Education, 2017.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20CS1T01 | Problem Solving and Programming Using C | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**At the end of the Course, the student will be able to**

CO1 : Build algorithms and to draw flowcharts for solving problems

CO2 : Convert flowcharts/algorithms to C Programs, compile and debug programs

CO3 : Use different operators, data types and write programs that use two-way/ multi-way selection

CO4 : Select the best loop construct for a given problem

CO5 : Design and implement programs to analyze the different pointer applications

CO6 : Decompose a problem into functions and to develop modular reusable code

**SYLLABUS:**

**UNIT-I :**

**Introduction to Computers**: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers.

**Introduction to the C Language:** Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Type Qualifiers.

**Structure of a C Program:** Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs.

**UNIT-II :**

**Bitwise Operators:** Exact Size Integer Types, Logical, Bitwise Operators, Shift Operators.

**Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions.

**Repetition:** Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples.

**UNIT-III :**

**Arrays:** Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example- Calculate Averages

**Strings:** String Concepts, C String, String Input / Output Functions, Arrays of Strings, String

Manipulation Functions String/ Data Conversion, A Programming Example- Morse Code

**Enumerated, Structure, and Union:** The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application.

**UNIT-IV :**

**Pointers:** Introduction, Pointers to pointers, Compatibility, L value and R value

**Pointer Applications:** Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application.

**Processor Commands:** Processor Commands.

**UNIT-V :**

**Functions:** Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Storage Classes, Scope, life time, Passing Array to Functions, Passing Pointers to Functions, Command Line Arguments, Recursion

**Text Input / Output:** Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

**Binary Input / Output:** Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**E-Resources:**

1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.programiz.com/c-programming
3. https://www.javatpoint.com/c-programming-language-tutorial

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20GE1M01 | Environmental Science | 2 | 0 | 0 | 0 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : identify the fundamental concepts and the first global initiatives towards sustainable development and the possible means to combat the challenges

CO2 : examine the natural resources, their availability for the sustenance of the life and recognize the need to promote the green technologies to conserve the natural resources

CO3 : assess the concepts of the ecosystem, its function in the environment and the need for protecting various ecosystems

discuss the biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity

CO4 : explain various attributes of the pollution and their impacts and measures to control the pollution along with waste management practices

CO5 : outline the social issues including the environmental legislations of india and environmental assessment and also to investigate the industrial, urban and rural conditions in the surroundings.

**SYLLABUS**

**UNIT-I : Scope and Importance of Environmental Studies**

Definition and components of environment, Scope and Importance: Sustainability: Stockholm and Rio Summit: Global Environmental Challenges: Global warming and climate change- Acid rains, Ozone layer depletion, Population Explosion and effects, Role of IT in environmental protection and human health.

**UNIT-II : 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,

**Energy resources:** Growing energy needs, renewable and non-renewable energy sources

**Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

**UNIT-III : Ecosystems and Biodiversity and its conservation**

Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem –Bio geo chemical cycles-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.

Green Campus and Green Energy. Identification of species by involving in activities like plantation inside or outside the campus.

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

**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.

Industrial Disasters and Pollution Case studies: -Bhopal Disaster, Chernobyl accident, Love canal Disaster.

**UNIT-V : Environmental Legislation and the Environmental Management**

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

Impact Assessment and its significance-various stages of EIA, preparation of EMP and EIS, Eco-tourism.

Visit to an Industry / Urban/Rural/Agricultural Ecosystem and submit a report individually on any

issues or Documentation of Plants and Animals

(Field work Equal to 3 lecture hours).

**TEXT BOOKS:**

1. Environment Studies, Fourth Edition, Anubha Kaushik, C P Kaushik, New Age International Publishers.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
3. Fundamentals of Environment Studies, Mahua Basu and S. Xavier, Cambridge Publishers, 2014.
4. Textbook of Environmental Science, M. Anji Reddy, B S Publications, Hyderabad.

**REFERENCE BOOKS:**

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers,2014

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH1L01 | English Communicative Skills Lab | 0 | 0 | 3 | 1.5 |

**Module - I:** Introduction to Phonetics.

a) Brief Introduction to Consonants
b) Brief Introduction to Vowels & Diphthongs

**Module - II:** Listening Comprehension

a) Comprehending Spoken material in British English.
b) Comprehending Spoken material in American English.
c) Intelligent Listening in Situations.

**Module -III:** Role – Play / Dialogue Writing

a) Introducing one and others.
b) Asking for and giving information.
c) Asking for and responding to give directions.
d) Seeking permission, requests.
e) Apologizing.

**Module - IV:** Communication Skills

a) Verbal and Non – verbal communications
b) Barriers of communication.
c) Body Language – Voluntary and Involuntary.

**Module - V:** Presentation Skills.

a) Extempore
b) JAM Sessions
c) Paper Presentation

**Module - VI:**

a) Group Discussions: Dos and Don'ts- Types, Modalities
b) Resume Preparation.

**References:**

1. Infotech English, Maruthi Publications (with Compact Disc).
2. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
3. English Pronunciation in use- Mark Hancock, Cambridge University Press.
4. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
5. English Pronunciation in use- Mark Hewings, Cambridge University Press.
6. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
7. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.
8. Technical Communication- Meenakshi Raman, Sangeeta Sharma, Oxford University Press.
9. Technical Communication- Gajendrea Singh Chauhan, Smita Kashiramka, Cengage Publications.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH1L02 | Applied Physics Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : **memorize** the conditions for sustained interference and diffraction.

CO2 : **understand** the basic concepts of laser.

CO3 : **identify** the properties of various materials.

CO4 : **apply** the concept of dielectrics on the materials.

CO5 : **analyze** the acoustic properties of sound.

**LIST OF EXPERIMENTS:**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
4. Energy Band gap of a Semiconductor p - n junction.
5. Characteristics of Thermistor – Temperature Coefficients
6. Determination of dielectric constant.
7. LASER - Determination of wavelength by plane diffraction grating
8. Rigidity modulus of material by wire-dynamic method (Torsional pendulum)
9. Verification of laws of vibrations in a stretched string – Sonometer
10. LASER - Determination of particle size using laser.
11. Determination of moment of inertia of a fly wheel.
12. Melde's Experiment – Transverse and longitudinal waves.
13. Determination of time constant – C- R Circuit.
14. I/V Characteristics of ZENAR diode.
15. Determination of Young's Modules of the given Beam – Cantilever.

**Note: Minimum 10 experiments mandate**

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: I**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20CS1L01 | Problem Solving and Programming Using C Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

**After successful completion of this course, students will be able to**

CO1 : gains knowledge on various concepts of a C language

CO2 : draw flowcharts and write algorithms.

CO3 : design and development of C problem solving skills

CO4 : design and develop modular programming skills.

CO5 : trace and debug a program

**LIST OF EXPERIMENTS:**

**Exercise 1:**

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

**Exercise 2:**

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

**Exercise 3:**

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

**Exercise 4:**

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

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

**Exercise 5:**

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

**Exercise 6:**

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

**Exercise 7:**

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

**Exercise 8:**

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

**Exercise 9:**

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

**Exercise 10:**

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

**Exercise 11:**

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

**Exercise 12:**

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

**Exercise 13:**

1. Write a program in C to show how a function returning pointer.

2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

**Exercise 14:**

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

**Exercise 15:**

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

**Exercise 16:**

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH2T04 | Applied Chemistry | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : understand the importance of plastics and composites in various fields.

CO2 : apply corrosion control methods to protect metals.

CO3 : understand the importance of advanced materials in engineering.

CO4 : understand computational chemistry and importance of molecular machines.

CO5 : understand the use of non-conventional energy sources to produce power.

**SYLLABUS**

**UNIT-I : Polymer Technology**

**Polymerisation:** Introduction-methods of polymerization (emulsion and suspension)-physical and mechanical properties.

**Plastics:** Compounding-fabrication (compression, injection, blown film, extrusion) - preparation, properties and applications of PVC, polycarbonates and Bakelite-mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

**Elastomers:** Natural rubber-drawbacks-vulcanization-preparation, properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes).

**Composite materials:** Fiber reinforced plastics-conducting polymers-biodegradable polymers.

**UNIT-II : Analytical Techniques and Corrosion**

**Analytical Techniques:** Conductometric titrations – titrations between strong acid and strong base, strong acid and weak base. Potentiometric titrations (redox titrations). Complexometric titrations using EDTA

**Corrosion:** Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, waterline corrosion-passivity of metals-galvanic series -factors influencing rate of corrosion-corrosion control (proper designing, cathodic protection)-Protective coatings: Surface preparation, cathodic and anodic coatings, electroplating, electroless plating (nickel). Paints (constituents, functions, special paints).

**UNIT-III : Material Chemistry**

**Non-elemental semiconducting materials**: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal

pulling, epitaxy, diffusion, ion implantation) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

**Insulators**: Electrical insulators- applications.

**Nano materials**: Introduction-sol-gel method- characterization by BET, SEM and TEM methods applications of graphene-carbon nanotubes and fullerenes: Types, preparation and applications

**Liquid crystals:** Introduction-types-applications.

**Super conductors:** Type –I, Type II-characteristics and applications

**UNIT-IV : Advanced Concepts/Topics In Chemistry**

Computational chemistry: Introduction, Ab Initio 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

**UNIT-V : Green Chemistry & Non-Conventional Energy Sources**

**Green Chemistry:** Green synthesis Principles –Applications- 3 or 4 methods of synthesis with examples – $R_4M_4$ principles

**Non-Conventional Energy Sources:** Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, ocean thermal energy conversion, tidal and wave power.

**TEXT BOOKS:**

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

**REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 edition.
2. Engineering Chemistry by Bharathi kumari Yelamanchili, VGS series.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH2T06 | Differential Equations | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : solve the differential equations and apply differential equations related to various engineering fields

CO2 : solve linear differential equations of second and higher order

CO3 : calculate Jacobian, maxima and minima of functions of two variables

CO4 : solve first order partial differential equations

CO5 : solve the higher order partial differential equations

**SYLLABUS**

**UNIT-I : Differential equations of first order and first degree**

Linear differential equations – Bernoulli equations – Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling - Law of natural growth and decay - Orthogonal trajectories.

**UNIT-II : Linear differential equations of higher order**

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, sin ax, cos ax, polynomials in x, $e^{ax}$ V(x), $x^n$V(x)- Method of Variation of parameters.

Applications: L-R circuit, C-R circuit and L-C-R circuit.

**UNIT-III : Differential Calculus**

Taylors and Mc Laurent's series for one & two variables – Functional dependence – Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

**UNIT-IV : First order Partial differential equations**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

**UNIT-V : Higher order Partial differential equations**

Solutions of Linear Partial differential equations with constant coefficients – RHS terms of the type $e^{ax+by}$ , sin(ax+by), cos(ax+by), $x^m y^n$ and Method of separation of Variables.

**TEXT BOOKS:**

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

**REFERENCE BOOKS:**

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.
2. **Dass H.K., Rajnish Verma. Er.,** Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.
3. **Peter O'Neil,** Advanced Engineering Mathematics, Cengage

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20ME2T01 | Engineering Graphics | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students will be able to**

CO1 : illustrate the fundamental Engineering Drawing Standards and discuss about conics and scales.

CO2 : draw the projection of points and straight lines

CO3 : draw the projection of planes

CO4 : understand the classification of solids and draw the projection of solids.

CO5 : draw isometric and orthographic projections

**SYLLABUS**

**UNIT-I :**

**Introduction to Engineering graphics:** Conventions in drawing-lettering - BIS conventions.

**Polygons**: Constructing regular Polygon by general methods

**Curves:** Conic sections in general method and Cycloid, Involutes tangent and normal for the curves

**Scales**: Plain scales, Diagonal scales and Vernier scale

**UNIT-II :**

**Introduction to Orthographic Projections**; Projections of Points in various quadrants, Projections of Straight Lines parallel to both planes Projections of Straight Lines-Parallel to one and inclined to other plane

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces

**UNIT-III :**

**Projections of Planes:** Regular Planes Perpendicular / parallel to one Reference Plane and inclined to other Reference Plane, Planes inclined to both the Reference Planes.

**UNIT-IV :**

**Projections of solids:** Projections of Prisms, Cylinders, with the axis inclined to one Reference Plane. Projections of Pyramids and Cones with the axis inclined to one Reference Plane

**UNIT-V :**

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

**TEXT BOOKS:**

1. Elementary Engineering Drawing By N.D.Bhatt, Charotar Publishing House
2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers.
3. Engineering Drawing, K.L.Narayana & P. Kannaiah, Scitech Publishers.

**REFERENCE BOOKS:**

1. A Text Book of Engineering Graphics By P.J.Shah S.Chand & Company Ltd., New Delhi
2. Engineering Graphics I and II by Arunoday Kumar Tech Max Publication, Pune
3. A text book of Engineering Drawing By P.S.Gill S.K.Kataria & sons, Delhi

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20CS2T01 | Python Programming | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students will be able to**

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.

**SYLLABUS**

**UNIT-I :**

**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.

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

Programming**:** Introduction to Programming Concepts with Scratch.

**UNIT-II :**

**Repetition Structures:** Introduction, while loop, for loop, Nested Loops.

**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, string pattern matching. 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

**UNIT-III :**

**List and Dictionaries:** Lists, tuple, Dictionaries and sets, frozen sets.

**Design with Function:** Defining Simple Functions, Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Managing a Program's Namespace, Higher Order Function. **Modules:** Modules, Standard Modules, Packages

**UNIT-IV :**

**Object Oriented Programming:** Concept of class, object and instances, Constructor, class attributes and destructors, Inheritance, overlapping and overloading 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.

**UNIT-V :**

**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 GUI Resources, Turtle Graphics

**Testing**: Basics of testing? unit testing in python, writing test cases, running tests.

**TEXT BOOKS:**

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
3. Reema Thareja, Python Programming using problem solving Approach, Oxford University Press 2017
4. R. NageswaraRao core python Programming second Edition.

**REFERENCE BOOKS:**

1. Introduction to Python Programming, Gowrishankar.S, VeenaA, CRC Press.
2. Introduction to Programming Using Python, Y. Daniel Liang,Pearson.

**E - Resources:**

1. https://www.tutorialspoint.com/python3/python_tutorial.pdf
2. https://bugs.python.org/file47781/Tutorial_EDIT.pdf

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE2T01 | Network Analysis | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : solve electrical networks using various techniques.

CO2 : solve electrical networks using network topology concepts.

CO3 : solve electrical circuits using network theorems with AC and DC excitations.

CO4 : analyze the behavior of RLC networks for sinusoidal excitation.

CO5 : analyze magnetic circuits.

**SYLLABUS**

**UNIT-I : Fundamentals of Electrical Circuits**

Active and Passive Components and their V-I Relations - Dependent and Independent Sources - Source Transformation Technique - Network Reduction Techniques-Series, Parallel and Series – Parallel Combination of R, Land C (Each Element Separately) – Star/Delta and Delta/Star Transformation, Nodal Analysis and Mesh Analysis with Dependent and Independent Voltage and Current Sources for Both DC and AC Excitation.

**UNIT-II : Network Topology**

Definition- Graph- Node – Branch – Links – Twigs - Tree, Co-Tree Basic Cut-Set and Basic Tie-Set Matrices for Planar Networks — Duality & Dual Networks.

**UNIT-III : Single Phase A.C Circuits**

Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, J-Notation, R.M.S, Average Values and Form Factor for Different Periodic Wave Forms - Concept of Reactance, Impedance, Susceptance and Admittance - Power Factor and Significance-Real and Reactive Power, Complex Power – Simple Problems.

**Resonance:** Resonance-Series, Parallel Circuits, Concept of Band Width and Q Factor.

**UNIT-IV : Network Theorems with DC & AC Excitation**

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem and Compensation Theorem.

**UNIT-V : Magnetic Circuits**

Basic Definition of MMF, Flux and Reluctance, Analogy Between Electrical and Magnetic Circuits, Faraday's Laws of Electromagnetic Induction – Concept of Self and Mutual Inductance, Dot Convention – Coefficient of Coupling and Composite Magnetic Circuit, Analysis of Series and Parallel Magnetic Circuits.

**TEXT BOOKS:**

1. Charles K. Alexander, Mathew N.O. Sadiku, Fundamentals of Electric Circuits, 6th ed. Tata McGraw-Hill, 2019.
2. A. Sudhakar and Shyammohan S Palli, Circuits and Networks Analysis & Synthesis, 5th ed. Tata McGraw- Hill, 2017.
3. A. Chakrabarti, Circuit Theory, 7th revised ed. Danapat Rai & Co publisher, 2018.

**REFERENCE BOOKS:**

1. William Hayt and Jack E.Kemmerley, Engineering Circuit Analysis, 6th ed. (Eighth), Mc Graw Hill Company, 2013.
2. N.C. Jagan, C. Lakshmi Narayana, Network Analysis, 2nd ed. BS publications, 2017.
3. Van Valkenburg, Network Analysis, 3rd ed. Prentice-Hall of India Private Ltd, 2019.
4. Syed A. Nasar, 3000 Solved Problems in Electrical Circuit (Schaum's solved problem series), Tata McGraw-Hill, 2018.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH2L04 | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : estimate unknown solutions by using volumetric titration method.

CO2 : analyze the quality of water.

CO3 : determine the $p^H$ of liquid samples.

CO4 : measure the strength of acids by conductometric and potentiometric titrations.

CO5 : estimate the acid content in fruit juices and soft drinks.

**LIST OF EXPERIMENTS**

1. Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, volumetric titrations, quantitative analysis
2. Estimation of HCl using standard $Na_2CO_3$ solution.
3. Estimation of alkalinity of a sample containing $Na_2CO_3$ and NaOH.
4. Estimation of total hardness of water using standard EDTA solution.
5. Estimation of copper using standard EDTA solution.
6. Estimation of zinc using standard EDTA solution.
7. Estimation of Ferrous iron using standard $K_2Cr_2O7$ solution.
8. Estimation of $KMnO_4$ using standard Oxalic acid solution.
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base.
11. Conductometric Titrations between strong acid and Weak base.
12. Preparation of Bakelite.
13. Estimation of acid content in soft drinks.
14. Potentiometric Titrations between ferrous iron with potassium dichromate.
15. Estimation of copper (II) using standard hypo solution.
16. Estimation of iron (III) by colorimetric method.

**Note: Any 10 experiments mandate out of 16 experiments**

**Reference Books**

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr.Bharathi Kumari Yelamanchili - Laboratory Manual of Engineering Chemistry, VGS Techno Series

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20CS2L01** | **Python Programming Lab** | **0** | **0** | **3** | **1.5** |

**COURSE OUTCOMES:**

**After successful completion of this course, students will be able to**

CO1 : Write, Test and Debug Python Programs

CO2 : Use Conditionals and Loops for Python Programs

CO3 : Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO4 : Use various applications using python

**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.

```
*
**
***
****
```

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 be1,000,000.
11. Write a program that generates a list of 20 random numbers between 1 and100.
    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.
12. Write a program to use split and join methods in the given string and store them in a dictionary data structure.
13. 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].
14. 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.
15. Write a function called *sum_digits*that is given an integer num and returns the sum of the digits of num.
16. 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.
17. Write a function called *number_of_factors*that takes an integer and returns how many factors the number has.
18. Write a function called *is_sorted*that is given a list and returns True if the list is sorted and False otherwise.
19. Write a function called root that is given a number x and an integer n and returns x1/n. In the function definition, set the default value of n to 2.
20. 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
21. 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 the user's word.
22. 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.

23. 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 calledftemps.txt.
24. 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.
25. 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.
26. Write a Python class to implement pow (x, n).
27. Write a Python class to reverse a string word by word.
28. Write a program to demonstrate Try/except/else.
29. Write a function nearly _equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
30. Write a python program to create wheel using turtle graphics.
31. Write a python program on GUI to create a Registration form.
32. Write a python program to check whether a string starts and ends with the same character or not (using Regular Expression re module).

**Text Books**

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
3. Reema Thareja, Python Programming using problem solving Approach, Oxford University Press 2017
4. R. Nageswara Rao core python Programming second Edition.

**Reference Books:**

1. Introduction to Python Programming, Gowrishankar.S, VeenaA, CRC Press.
2. Introduction to Programming Using Python, Y. Daniel Liang,Pearson.

**E-Resources:**

1. https://www.tutorialspoint.com/python3/python_tutorial.pdf
2. https://bugs.python.org/file47781/Tutorial_EDIT.pdf

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20CS2L02 | IT Workshop | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

**After successful completion of this course, students will be able to**

CO1 : Describe evolution of computers, storage devices, networking devices, transmission media and peripherals of a computer.

CO2 : Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO3 : Construct a fully functional virtual machine, Summarize various Linux operating system commands.

CO4 : Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex.

**LIST OF EXPERIMENTS**

**Computer Hardware:**

**Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones:**

Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

**Operating Systems:**

**Experiment 2: Virtual Machine setup:**

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

**Experiment 3: Operating System installation:**

- Installing an Operating System such as Linux on Computer hardware.

**Experiment 4: Linux Operating System Commands**

- General command syntax, Basic help commands, Basic File system commands, Date and Time
- Basic Filters and Text processing, Basic File compression commands
- Miscellaneous: apt-get, vi editor

**Networking and Internet**

**Experiment 5: Networking Commands**

ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp.

**Internet Services:**

**Experiment 6:**

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn

**Productivity Tools:**

**Office Tools**

**Experiment 7:**

Demonstration and Practice on Text Editors like Notepad++, Sublime Text, Atom, Brackets, Visual code, etc

**Experiment 8:**

Demonstration and practice on Microsoft Word, Power Point

**Experiment 9:**

Demonstration and practice on Microsoft Excel.

**Experiment 10:**

Demonstration and practice on LaTeX and produce professional PDF documents.

**Experiment 11:**

**Internet of Things (IoT)**: IoT fundamentals, applications, protocols, Architecture, IoT Devices communication models.

**Introduction to HTML:**

**Experiment 12:**

Understanding HTML tags and creation of simple web pages.

**Assignment**: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

**TEXT BOOKS:**

1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH
3. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand.
4. HTML & CSS, The Complete Reference, Fifth Edition, Thomas A. powell
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.

**REFERENCE TEXT BOOKS:**

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2nd edition, Tata McGraw-Hill, 2002.
2. "MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
4. Bigelows, "Trouble shooting, Maintaining& Repairing PCs", TMH.
5. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition

**E-RESOURCES:**

1. https://explorersposts.grc.nasa.gov/post631/20062007/computer_basics/ComputerPorts.doc
2. https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc
3. https://www.thegeekstuff.com/2009/07/linux-ls-command-examples
4. https://www.pcsuggest.com/basic-linux-commands/
5. https://www.vmware.com/pdf/VMwarePlayerManual10.pdf
6. https://gsuite.google.com/learning-center/products/#!/
7. https://www.raspberrypi.org

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH3T03 | Numerical Methods and Transformations | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : evaluate approximating the roots of polynomial and transcendental equations

CO2 : apply newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals

CO3 : apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations

CO4 : apply the Laplace transform for solving differential equations

CO5 : find or compute the Fourier series of periodic signals and apply integral expressions for the forwards and inverse Fourier transform to a range of non- periodic waveforms

**SYLLABUS**

**UNIT-I : Iterative methods**

Introduction – Bisection method – Iteration method – Newton-Raphson method (One variable) – Jacobi and Gauss-Seidel methods for solving system of equations.

**UNIT-II : Interpolation**

Introduction – Finite differences – Forward differences – Backward differences – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula.

**UNIT-III : Numerical integration and solution of ordinary differential equations**

Trapezoidal rule – Simpson's 1/3rd and 3/8th rule – Solution of ordinary differential equations by Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order).

**UNIT-IV : Laplace Transform**

Laplace transforms of standard functions-Shifting Theorems, Transforms of derivatives and integrals, Inverse Laplace transforms– Convolution theorem (without proof).

**Application:** Solutions of ordinary differential equations using Laplace transforms

**UNIT-V : Fourier Series**

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

**Fourier Transforms**: Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

**TEXT BOOKS:**

1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley-India.
2. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC3T01** | **Electronic Devices and Circuits** | 2 | 1 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : Apply the PN junction characteristics for the diode applications such as switch, clippers, clampers and rectifiers.

CO2 : Analyze the input and output characteristics of transistor configurations fordetermining the input- output resistances, current gain and voltage gain.

CO3 : Design the various biasing techniques for BJT, JFET and MOSFETsAmplifier circuits considering stability condition for establishing a proper operating point.

CO4 : Compute the characteristic parameters of FET and MOSFETs in common source, common drain and common gate amplifiers using the drain and the transfer characteristics.

CO5 : Estimate the characteristic parameters of FET amplifier circuits using lowfrequency model.

**SYLLABUS**

**UNIT-I : P-N JUNCTION DIODES**

Formation of PN junction, Energy band diagram of open circuited PN junction, operation of forward and reverse biased PN junction diode, Volt-Ampere characteristics, Temperature dependence on V–I characteristic, Diode resistances and capacitances, Diode current equation; Special diodes - breakdown mechanisms, zener diode, zener diode as voltage regulator, tunnel diode, varactor diode..

**UNIT-II : DIODE APPLICATIONS**

Rectifiers - Analysis of half wave, Full wave and bridge rectifiers; Filters - inductor filter, capacitor filter, L- section filter and π- section filter, analysis in terms of ripple factor; Clipping and clamping circuits - elementary diode clippers and clamping circuits.

**UNIT-III : TRANSISTORS**

Bipolar Junction Transistor (BJT) - construction and working of BJ T, BJT characteristics; Junction Field Effect Transistor (JFET) - construction and working of JFET, JFET characteristics; MOSFET - construction and working of MOSFET, MOSFET characteristics, Comparison of BJT, JFET and MOSFET.

**UNIT-V : TRANSISTOR BIASING & STABILIZATION**

Introduction to amplifier, Need for biasing-DC load line, AC load line and Operating point; Thermal runaway, Thermal stability - stabilization against variations in $I_{CO}$,$V_{BE}$ and β stability factors (S,S',S''); Types of stabilization, Stabilization techniques, Compensation techniques.

**UNIT-V : SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER MODELS:**

**BJT:** Two port network, Transistor hybrid model, determination 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, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

**TEXT BOOKS:**

1. J. Millman and C.C.Halkias, "Electronic Devices and Circuits", 4th edition, Tata Mc-Graw Hill, 2015.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits",pearson/Prentice Hall, 4th edition, 2015.

**REFERENCE BOOKS:**

1. Salivahanan and N Suresh Kumar," Electronic Devices and Circuits", 4th edition, Tata Mc-Graw Hill, 2016.
2. Integrated Electronics-J. Millman, C. Halkias,Tata Mc-Graw Hill, SecondEdition,2009

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

Semester: III

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC3T02 | Digital System Design | 2 | 1 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : Apply the knowledge of digital logic concepts to optimize digital circuits.

CO2 : Analyze Combinational digital circuits for given problem statement by applying the digitaltechniques.

CO3 : Analyze Sequential digital circuits for given problem statement by applying the digital techniques.

CO4 : Compare the characteristics of logic families.

CO5 : Experiment using digital ICs to demonstrate a given application / problemstatement.

**SYLLABUS**

**UNIT-I : NUMBER SYSTEMS AND CODES:**

Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members. Gray code ,4 bit codes; BCD, Excess-3, 2421, 8421 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

**BOOLEAN THEOREMS AND LOGIC OPERATIONS:**

Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits. Study the pin diagram and obtain truth table for the following relevant ICs 7400,7402,7404, 7408,7432,7486.

**UNIT-II : MINIMIZATION TECHNIQUES**

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 5 variables) and tabular method (Quine-mccluskey method) with only four variables and single function.

**COMBINATIONAL LOGIC CIRCUITS DESIGN:**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a-head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

**UNIT-III : COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI &LSI**

Design code converts using Karnaugh method and draw the complete circuit diagrams. Design of encoder, decoder, multiplexer and de-multiplexers. Realization of Boolean functions using decoders

and multiplexers. Design of Priority encoder, 4-bit digital comparator. Study the relevant ICs pin diagrams and their functions 7442, 7447, 7485, 74154.

**INTRODUCTION OF PLD's:** PLDs: PROM, PAL, PLA.

**UNIT-IV : SEQUENTIAL LOGIC DESIGN:**

Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift, register, FSM, Sequence detectors. Study the following relevant ICs and their relevant functions 7474,7475,7476,7490,7493,74121.

**UNIT-V : INTRODUCTION TO DIGITAL LOGIC FAMILIES:**

Introduction to logic families: CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, Emitter coupled logic.

**TEXT BOOKS:**

1. Morris Mano and M.D. Ciletti, Digital Design, 4th edition, Pearson Education, 2007.
2. John. F. Walkerly, Digital Design Principles and Practices, 3rd edition, PHI/Pearson Education, 2015.

**REFERENCE BOOKS:**

1. Floyd. T. L, Digital Fundamentals, 9th edition, Pearson Education, 2009.
2. A. Anand kumar, Fundamentals of Digital circuits, 3rd edition, Prentice Hall of India,2014.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

Semester: III

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC3T03 | Signals and Systems | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : To understand the characteristics and properties of continuous time signals and systems

CO2 : To analyse the Spectral characteristics of Signal in Frequency domain using Fourier Series, Fourier transforms and Laplace transform

CO3 : To understand analysis of Linear systems.

CO4 : Apply the concept of convolution and Correlation for continuous time signals

CO5 : To understand the effect of the sampling of a continuous time signal.

**SYLLABUS**

**UNIT- I : BASICS OF SIGNALS & SYSTEMS**

Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude shifting, amplitude-scaling. 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 Representation of Fourier Series, Properties of Fourier series, Dirichilet's conditions, Related Problems

**UNIT- II : TRANSFORM**

**FOURIER TRANSFORM:** Fourier transforms from Fourier series, Fourier transform of arbitrary signal, Fourier transforms of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform. Related Problems.

**LAPLACE TRANSFORM:** Properties of Laplace Transform, Inverse Laplace transform, Relation between LT's, and F.T. of a signal.

**UNIT- III : ANALYSIS OF LINEAR SYSTEMS**

Introduction, Linear system, impulse response, Linear time invariant (LTI) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

**UNIT- IV : CONVOLUTION AND CORRELATION SIGNALS**

Concept of Convolution in time domain and Frequency domain, Graphical representation of convolution, Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering. Related Problems

**Unit-V : SAMPLING**

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, Related Problems.

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. BP Lathi, Principles of Linear Systems and Signals, Oxford University Press, 2015
2. T K Rawat, Signals and Systems, Oxford University press, 2011.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH3T01 | Managerial Economics & Financial Analysis | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.

CO2 : The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

CO3 : The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.

CO4 : The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.

CO5 : The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision-making.

**SYLLABUS**

**UNIT- I : Introduction to Managerial Economics and demand Analysis**

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply

**UNIT- II : Theories of Production and Cost Analysis**

Theories of Production function- Law of Variable proportions-Iso quants and Iso costs and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs – Cost –Volume Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

**UNIT- III : Introduction to Markets, Theories of the Firm & Pricing Policies**

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles Meaning and Features –Phases of a Business Cycle Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State / Public Enterprises and their forms.

**UNIT- IV** : **Introduction to Accounting & Financing Analysis**

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements - Analysis and Interpretation of Financial Statements - Ratio Analysis.

**Unit-V** : **Capital and Capital Budgeting**

Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (Pay-Back Period, Accounting Rate of Return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**TEXT BOOKS:**

1. A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

**REFERENCE BOOKS:**

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & CompanyLtd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & CompanyLtd,
4. Maheswari S.N, An Introduction to Accountancy, Vikas Publishing House PvtLtd
5. I.M Pandey, Financial Management, Vikas Publishing House PvtLtd
6. V. Maheswari, Managerial Economics, S. Chand & CompanyLtd.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20GE3M01 | Constitution of Indian | 2 | 0 | 0 | 0 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

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

**SYLLABUS**

**UNIT-I :**

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

**UNIT-II :**

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

**UNIT-III :**

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

**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: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

**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.

**REFERENCES:**

1. Durga Das Basu, Introduction to the Constitution of India, 12th edition Prentice – Hall of India Pvt. Ltd. New Delhi 2011.
2. Subash Kashyap, Indian Constitution, 2nd edition, National Book Trust, 2011.
3. J.A. Siwach, Dynamics of Indian Government & Politics, 2nd edition, Sterling Pub Private Ltd.,1990.
4. D.C. Gupta, Indian Government and Politics, 8th edition, Vikas Publishing House Pvt Ltd., 2015.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication), 2015.
6. J.C. Johari, Indian Government and Politics Hans, 13th edition, Shoban Lal & Co.2012.
7. J. Raj Indian Government and Politics, 1st edition, SAGE Texts Publication, 2008.
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, 3rd edition, Lexis Nexis Publications, 2008.
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

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC3L01 | Electronics Devices and Circuits Laboratory | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES**:

After successful completion of this course, students should be able to:

CO1 : Know the operation of various electronic devices like PN junction diode, Zener Diode, SCR and UJT

CO2 : Compare and contrast the various Rectifier circuits by based on ripple factors.

CO3 : Calculate the component parameters for the given BJTs and FETs with the help of their characteristics

CO4 : Design the proper biasing circuit for the given BJT or FET

CO5 : Know the various amplifiers frequency responses and calculate the bandwidth of corresponding amplifier

CO6 : Design the various electronic circuits using electronic components like PN junction diode, Zener Diode, SCR and UJT

**LIST OF EXPERIMENTS**

**Minimum of Twelve Experiments to be done.**

1. Plot the forward and reverse bias characteristics of PN junction diode and determine cut-in voltage ($V_\gamma$), static and dynamic resistances.
2. Plot the VI characteristics of Zener diode and construct a regulator with Zener diode.
3. Design a circuit to generate a positive edge trigger and negative edge trigger waveforms using diodes.
4. Design a half wave, full wave & bridge rectifier and compare ripple factor with and without filters (C, L, L-section and $\pi$).
5. Design a Regulated Power Supply and measure output.
6. Measure h-parameters form CB, CE configuration characteristics.
7. Measure JFET- parameters from CS configuration characteristics.
8. Design a self-bias circuit for BJT and compare with fixed bias.
9. Design a collector base bias and compare with fixed bias.
10. Design self-bias for the n-channel JFET.
11. Design any experiment for the Applications of Diode.
12. Obtain frequency response of CE, CC and CS -amplifier.
13. Observer the characteristics of UJT (calculate intrinsic stand-off ratio ($\eta$)).

14. Obtain characteristics of SCR.
15. Design a circuit with UJT to generate Saw tooth wave with required frequency.

**TEXT BOOKS:**

1. J. Millman, C. Halkias, Electronic Devices and Circuits, Tata Mc-Graw Hill, SecondEdition,2007
2. Robert L.Boylestad and Loui Nashelsky, Electronics devices & circuit theory, Pearson/Prentice hall, tenth edition,2009.

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC3L02** | **Digital System Design Laboratory** | **0** | **0** | **3** | **1.5** |

**COURSE OUTCOMES**:

After successful completion of this course, students should be able to:

CO1 : Apply and verify the concept of digital circuits practically.

CO2 : Develop skill to build and troubleshoot digital circuits

**LIST OF EXPERIMENTS**

1. Basic Logic Gates.
2. Adders: Half Adder, Full Adder, Ripple Carry Adder.
3. Subtractors: Half Subtractors, Full Subtractors.
4. Encoder.
5. Decoder.
6. Multiplexer.
7. De-Multiplexer.
8. Parity Circuits.
9. Code Converters.
10. Flip Flops: SR, JK, D, T.
11. Registers.
12. Counters.
13. Sequence Detectors.

* Above said Experiments can be verified with the Hardware ICs.

**REFERENCES**

1. Department Lab Manual

2. Morris Mano and M.D. Ciletti, “Digital Design”, 4th edition, Pearson Education, 2007.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC3L03 | OOP's Through C++ Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES**:

After successful completion of this course, students should be able to:

CO1 : Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.

CO2 : Apply an object-oriented approach to developing applications of varying complexities

**LIST OF EXPERIMENTS**

**Exercise – 1 (Basics)**

Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user

a) Convert any two programs that are written in C into C++

b) Write a description of using g++ (150 Words)

**Exercise – 2 (Expressions Control Flow)**

a) Write a Program that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.

b) Write a Program to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

**Exercise – 3** (Variables, Scope, Allocation)

a) Write a program to implement call by value and call by reference using reference variable.

b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory
Allocation)

c) Write a program to illustrate Storage classes

d) Write a program to illustrate Enumerations

**Exercises –4** (Functions)

Write a program illustrating Inline Functions

a) Write a program illustrates function overloading. Write 2 overloading functions for power.

b) Write a program illustrates the use of default arguments for simple interest function.

**Exercise -5** (Functions –Exercise Continued)

a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers

b) Write a program illustrate function template for power of a number.

c) Write a program to illustrate function template for swapping of two numbers.

**Exercise -6** (Classes Objects)

Create a Distance class with:

- ✓ feet and inches as data members
- ✓ member function to input distance
- ✓ member function to output distance
- ✓ member function to add two distance objects

a). Write a main function to create objects of DISTANCE class. Input two distances and output the sum.

b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)

c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem)

d). Write a C++ program demonstrating a Bank Account with necessary methods and variables

**Exercise – 7** (Access)

Write a program for illustrating Access Specifiers public, private, protected

a) Write a program implementing Friend Function

b) Write a program to illustrate this pointer

c) Write a Program to illustrate pointer to a class

**Exercise -8** (Operator Overloading)

a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non-Member Function.

i. Unary operator as member function

ii. Binary operator as nonmember function

b). Write a c ++ program to implement the overloading assignment = operator

c). Write a case study on Overloading Operators and Overloading Functions (150 Words)

**Exercise -9** (Inheritance)

a) Write C++ Programs and incorporating various forms of Inheritance

i) Single Inheritance

ii) Hierarchical Inheritance

iii) Multiple Inheritances

iv) Multi-level inheritance

v) Hybrid inheritance

b) Write a program to show Virtual Base Class

c) Write a case study on using virtual classes (150 Words)

**Exercise-10** (Inheritance –Continued)

a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance

b) Write a Program to *show* how *constructors* are invoked in *derived class*

**Exercise -11** (Polymorphism)

a) Write a program to illustrate runtime polymorphism

b) Write a program to illustrate this pointer

c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.

d) Write a case study on virtual functions (150 Words)

**Exercise -12**(Templates)

a) Write a C++ Program to illustrate template class

b) Write a Program to illustrate class templates with multiple parameters

c) Write a Program to illustrate member function templates

**Exercise -13** (Exception Handling)

a). Write a Program for Exception Handling Divide by zero

b). Write a Program to rethrow an Exception

**Exercise -14** (STL)

a) Write a Program to implement List and List Operations

b) Write a Program to implement Vector and Vector Operations

**Exercise -15** (STL Continued)

a) Write a Program to implement Deque and Deque Operations

b) Write a Program to implement Map and Map Operations

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC4T01 | Electronic Circuit Analysis | 3 | 0 | 0 | 3 |

### COURSE OUTCOMES:

**After successful completion of this course, students should be able to**

CO1 : Design and analyze multistage amplifiers.
CO2 : Design negative feedback amplifier circuits
CO3 : Design various oscillators
CO4 : Analyze and design solid state power amplifier circuits.
CO5 : Analyze and design tuned amplifier circuits.

### SYLLABUS

**UNIT-I : MULTISTAGE AMPLIFIERS:**

Classification of amplifiers, Distortion in amplifiers, Frequency response of an Amplifier, CE short circuit current gain, High frequency response of a CE stage. Gain bandwidth product, Design of two stage amplifier, Common Source and Common Drain amplifier at high frequencies. Effect of coupling and bypass capacitors, Differential amplifiers, Analysis of Differential amplifiers.

**UNIT-II : FEEDBACK AMPLIFIERS**

Classification of amplifiers, Feedback concept, the transfer gain with feedback, General characteristics of negative feedback amplifiers. Impedance in feedback amplifiers. Propertiesof feedback amplifier topologies, Method of analysis of a feedback amplifier.

**UNIT-III : OSCILLATORS**

Sinusoidal oscillators, Barkhausen Criterion, Analysis and design of RC phase shift (FET/ BJT) oscillator, Wien bridge oscillators. Resonant circuit oscillators, General form of oscillator circuit (Hartley & Colpitts), Crystal oscillators.

**UNIT-IV : POWER AMPLIFER**

Class A, B, AB, and C power amplifiers, push – pull and complementary symmetry push-pull amplifier. Design of heat sinks, power output, efficiency, crossover distortion and harmonic distortion.

**UNIT-V : TUNED AMPLIFIER**

Design and analysis of single tuned amplifier circuit with a capacitor coupled load, double tuned, staggered tuned amplifiers. Stability consideration, Class B and class C tuned power amplifiers.

### TEXT BOOKS:

1. J.Millman&Halkias, Integrated Electronics, TMH, 2008.
2. J.Millman& Arian Grabel, Micro Electronics, 2nd Edition, TMH, 2001.

**REFERENCE BOOKS:**

1. A.S.Sedra&K.C.Smith, Micro Electronic Circuits, 4th edition, Oxford press
2. J.B.Gupta, Electronic devices and circuits, 4th edition, S.K.Kataria and sons

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

Semester: **IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC4T02** | **Analog Communication Engineering** | **3** | **0** | **0** | **3** |

## COURSE OUTCOMES:

**After successful completion of this course, students should be able to**

CO1 : Define different Communications system and recognize various applications of it.

CO2 : Compute the bandwidth and reception power by analyzing time domain signalrequired under various modulation schemes

CO3 : Asses and evaluate different modulation and demodulation techniques. perform pulse type techniques (PAM, PWM, PPM) Transmission and reception.

CO4 : Design basic analog communication systems to solve a given communication problems

CO5 : Evaluate the influence of noise on communication signals

## SYLLABUS

**UNIT-I : INTRODUCTION TO COMMUNICATION SYSTEM**

Block schematic of communication system, Simplex and duplex systems, Modes of communication: Broadcast and point to point communication, Necessity of modulation, Classification of modulation, sampling theorem and pulse analog modulation, multiplexing: TDM, FMD.

**UNIT-II : AMPLITUDE MODULATION**

Amplitude Modulation: Introduction, Mathematical analysis and expression for AM, Modulation index, Frequency spectrum and bandwidth of AM, Power calculations, Generation of AM using nonlinear property, Low and high level modulation, Balance Modulator, Types of AM: DSB-FC, DSB-SC, SSB-SC, ISB and VSB, their generation methods and comparison.

**UNIT-III : ANGLE MODULATION**

Introduction, Mathematical analysis of FM and PM, Modulation index for FM and PM, Frequency spectrum and bandwidth of FM, Narrow band and wide band FM, Direct and indirect methods of FM generation, Pre emphasis and de-emphasis, Comparison of AM, FM and PM, Pulse Modulation: Types of pulse modulation, PAM(Single polarity, double polarity),PWM: Generation & demodulation of PWM,PPM: Generation & demodulation of PPM.

**UNIT-IV : RADIO RECEIVERS AND DEMODULATORS**

Introduction, Performances characteristic of receivers: Sensitivity, Selectivity, Fidelity, Image

frequency and IFRR, Tracking and Double spotting, TRF, Super heterodyne receivers, RF amplifier, Local oscillator and mixer, IF amplifier, AGC, AM Detectors: Envelop detector and practical diode detector, FM Detectors: Slope detector, phase discriminator and ratio detector.

**UNIT-V : NOISE**

Introduction, Sources of noise, Classification of noise, Noise calculations (thermal noise), SNR, Noise figure, Noise Factor, Noise Temperature.

**TEXT BOOKS:**

1. Kennedy & Devis, Electronic Communication System, 4th ed., Tata Mc Graw Hill, 2008.
2. Sanjay Sharma, Analog Communication System, S. K. Kataria & Sons, 2012.

**REFERENCE BOOKS**

1. Anokh Singh and A K Chhabra, Principles of communication engineering, 17th ed., S.Chand Publishing, 1984.
2. Roddy & Coolen, Electronic communication, 4th ed., PHI, 2008.
3. Taub & Schilling, Principles of communication systems, 3rd ed., Tata Mc Graw Hill, 2008.

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC4T03 | Electromagnetic Theory and Transmission Lines | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 :Define E using various laws and applications of electric fields

CO2 :Observe the Maxwell equations to analyze the time varying behavior of EM waves

CO3 :Apply Maxwell's equations to know characteristics of uniform plane waves in various media.

CO4 :Discuss line equations and input impedance of Tx lines

CO5 :Analyze the Tx lines using reflection coefficient, VSWR and Smith chart.

**SYLLABUS**

**UNIT-I: ELECTROSTATICS**

Review of coordinate systems, Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Continuity Equation, Poisson's and Laplace's Equations; Capacitance–Parallel Plate, Coaxial Capacitors, Problems.

**UNIT-II: MAGNETOSTATICS**

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Problems.

**UNIT-III: EM WAVECHARACTERISTICS**

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves–Definition, All Relations Between E & H, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types. Illustrative Problems. Reflection and Refraction of PlaneWaves–Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Poynting Vector and Poynting Theorem–Applications, Problems.

**UNIT-IV: TRANSMISSIONLINES- I**

Types, T&π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities,

Infinite Line, Lossless lines, distortion less lines, Problems.

**UNITV: TRANSMISSIONLINES–II**

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Transmission lines as Circuit Elements; Impedance Transformations λ/4, λ /2, λ/8 Lines –. Smith Chart – Construction and Applications, Quarter wave transformer, Stub Matching-single, Illustrative Problems.

**TEXT BOOKS:**

1. Matthew N.O. Sadiku, Elements of Electromagnetic, 3rd ed, Oxford Univ. Press, 2001.
2. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, 2nd Edition, PHI, 2000.

**REFERENCE BOOKS:**

1. GSN Raju, Electromagnetic Fields and Wave Theory, Pearson Education 2006
2. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetic, 7th ed., TMH, 2006.
3. G S.BhushanaRao, Electromagnetic Field Theory and Transmission Lines, Wiley India 2013.

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE4T02 | Control Systems | 2 | 1 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : derive the transfer function of physical systems by applying block diagram and signal flow graph techniques.

CO2 : analysis of system using time domain specifications

CO3 : analysis the stability of system using frequency domain specifications and understand the compensators to improve system performance.

CO4 : analyze absolute and relative stability of LTI systems.

CO5 : examine the concepts of controllability and observability

**SYLLABUS**

**UNIT-I : Mathematical Modeling of Control Systems**

Introduction- Type of Control Systems -Open Loop and Closed Loop, Classification of Control Systems, Feedback Characteristics, and Transfer Function of Linear Systems, Differential Equations of Electrical Networks, Translational and Rotational Mechanical Systems, Block Diagram Reduction Techniques, Representation by Signal Flow Graph – Reduction Using Mason's Gain Formula.

**UNIT-II : Time Response Analysis**

Introduction-Standard Test Signals-Time Response of First Order Systems-Time Response of Second Order Systems-Time Domain Specifications, Steady State Errors and Error Constants, Effects of PI, PD and PID Controllers.

**UNIT-III : Frequency Response Analysis and Compensation**

**Frequency Response:** Introduction-Frequency Domain Specifications- Bode Plot-Polar Plots. **Compensation:** Lag, Lead, and Lag-Lead Compensators.

**UNIT-IV : Stability Analysis**

The Concept of Stability- Location of Poles on s-Plane for Stability- Routh's Stability Criterion-Limitations of Routh's Stability, Root Locus, Nyquist Stability Criterion.

**UNIT-V : State Space Analysis**

Concepts of State, State Variables and State Model - State Space Representation of Transfer Function

- State Transitions Matrix and Its Properties - Concept of Controllability and Observability.

**TEXT BOOKS:**

1. J. J Nagarath and M. Gopal, Control Systems Engineering, 6th ed., New Age International Publishers, 2017.
2. Benjamin C. Kuo, Automatic Control Systems, 9th ed., Wiley, 2014
3. Katsuhiko Ogata, Modern Control Engineering, 5th ed., Pearson Education India, 2015.

**REFERENCE BOOKS:**

1. Richard C. Dorf and R. H Bishop, Modern Control Systems, 12th ed., Pearson Education, 2009.
2. John J. D., Azzo Constantine, H. and Houpis Sttuart, N Sheldon, Linear Control System Analysis and Design with MATLAB, 5th ed., CRC Taylor& Francis, 2009.
3. M. Gopal, Control System: Principle and design, 4th ed., McGraw Hill Education, 2012.
4. NPTEL Video Lecture Notes on "Control Engineering" by Prof. S. D. Agashe, IIT Bombay.

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20CS4T04 | Data Structures | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**After successful completion of this course, students should be able to**

CO1 : analyze algorithms and describe searching, sorting and hashing techniques

CO2 : describe the concepts of stacks and queues.

CO3 : apply the concepts of linked lists.

CO4 : describe the concepts of trees.

CO5 : explain the concepts of graphs

**SYLLABUS**

**UNIT-I : Analysis of Algorithms**

Efficiency of algorithms, A priori Analysis, Asymptotic notations, Time complexity of algorithms using O-notation, Polynomial Vs Exponential algorithms, Average, Best, Worst case complexities, Analyzing recursive programs.

**Searching:** Introduction, Linear Search, Binary Search, Fibonacci Search.

**Internal Sorting:** Introduction, Bubble Sort, Insertion Sort, Selection Sort.

**Hashing:** Introduction, Hash Table Structure, Hash Functions.

**UNIT-II : Stacks and Queues**

**Stacks**: Introduction, Stack operations, Applications.

**Queues:** Introduction, Operations on queues, circular queues, Priority queues, Applications.

**UNIT-III :**

**Linked Lists**: Introduction, Singly linked lists, Circular linked lists, Doubly linked lists, Multiple linked lists, Applications.

**Linked Stacks and Linked Queues:** Introduction, Operations on linked stacks and linked queues, Dynamic memory management, Implementation of linked representations, Applications.

**UNIT-IV : Trees and Binary Trees, Binary Search Trees and AVL Trees**

**Trees and Binary Trees:** Introduction, Trees: Definition and Basic Terminologies, Representation of trees. Binary trees: Basic terminologies and types, representation of binary trees, binary tree traversals, applications.

**Binary Search Trees:** Introduction, Binary search trees: Definition and operations, **AVL Trees:** Definition and operations, Applications.

**UNIT-V :**

**Graphs:** Introduction, Definitions and basic terminologies, Representations of graphs, Graph traversals and applications.

**TEXT BOOKS:**

1. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, *Fundamentals of Data structures in C++*,2nd Edition, University Press (India)Pvt.Ltd.,2008.

**REFERENCES:**

1. G.A.V. PAI, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume1,1st Edition, TataMcGraw-Hill,2008.
2. Richard F. Gilberg & Behrouz A. Forouzan, Data Structures, Pseudo code Approach withC,2ndEdition, CengageLearningIndiaEdition,2007.
3. Langsam, M. J. Augenstein, A. M. Tanenbaum, Data structures using C and C++, 2ndEdition, PHI Education, 2008.
4. Sartaj Sahni, Ellis Horowitz, Fundamentals of Data Structures in C, 2nd Edition, Orient blacks wan, 2010.

**E- REFERENCES:**

1. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC4L01** | **Electronic Circuits and Analysis Laboratory** | **0** | **0** | **3** | **1.5** |

**COURSE OUTCOMES**:

**After successful completion of this course, students should be able to:**

CO1 : Apply the fundamental concepts to solve the transistor high frequency parameters like $f_T$

CO2 : Compare the operation of amplifiers with and without feedback

CO3 : Compare the operation of multistage amplifiers with single stage amplifiers

CO4 : Identify the suitable oscillator for generating of different frequency waveforms

CO5 : Determine the operation and maximum capability of given power amplifier

CO6 : Design a tuned amplifier to develop multiple engineering design solution

**LIST OF EXPERIMENTS**

***Minimum of Twelve Experiments to be done. Six to be done in hardware and six to be done using any simulation software***

1. Determine the $f_T$ of the given transistor.
2. Design Voltage-Shunt and Series Feedback Amplifier circuit and compare the behavior with and without feedback.
3. Design Current-Shunt and Series Feedback Amplifier circuit and compare the behavior with and without feedback.
4. Design a RC Phase Shift Oscillator circuit with BJT/FET to generate waveforms with different frequencies
5. Design a wein bridge, Heratly and Colpitt's Oscillator circuit with BJT/FET to generate waveforms with different frequencies
6. Design Two Stage RC Coupled Amplifier circuit and plot the frequency response curve.
7. Design Two Stage directly coupled Amplifier circuit and plot the frequency response curve.
8. Design a Darlington Pair Amplifier and calculate the voltage gain.
9. Design a Bootstrapped Emitter Follower and show that it increases the input impedance.
10. Design a Class-A Power amplifier and calculate the maximum efficiency.
11. Design a Class B power amplifier and show that maximum efficiency is 78.5%
12. Show the cross over distortion present in Complementary Symmetry Class B Amplifier and design a circuit to overcome cross over distortion.

13. Show the cross over distortion present in Class-B Push-Pull Power Amplifier and design a circuit to overcome cross over distortion.
14. Design a Single tuned amplifier and compare the performance theoretically and practically.
15. Design a Double tuned amplifier and compare the performance theoretically and practically.

**TEXT BOOKS:**

1. J. Millman, C. Halkias, Electronic Devices and Circuits, Tata Mc-Graw Hill, SecondEdition, 2007.
2. Salivahanan, Kumar, Vallavaraj, Electronic Devices and Circuits, 4thEdition, Tata Mc-Graw Hill, ,2008.

**REFERENCES:**

1. J. Millman, C. Halkias, Integrated Electronics, Second Edition, Tata Mc-Graw Hill, 2009.
2. B.P. Singh,Rekha, Electronic Devices and Integrated Circuits, Pearson publications,

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

Semester: **IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC4L02** | **Analog Communication Laboratory** | **0** | **0** | **3** | **1.5** |

**COURSE OUTCOMES**:

**After successful completion of this course, students should be able to:**

CO1 : Understand different modulation and demodulation techniques.

CO2 : Develop the ability to compare and contrast the strengths and weaknesses of various modulation techniques.

CO3 : Understand and explain the AGC Characteristics

CO4 : Write programs using MATLAB for various modulation methods.

**LIST OF EXPERIMENTS**

1. Amplitude modulation and demodulation
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Pre-emphasis & de-emphasis.
6. Frequency Division Multiplexing & De multiplexing
7. Time Division Multiplexing & De multiplexing
8. AGC Characteristics
9. Characteristics of mixer
10. Phase locked loop
11. Generation of DSBSC using ring modulation.
12. Frequency Synthesizer
13. Spectral analysis of AM and FM signals using spectrum analyzer

***Minimum of Ten Experiments and the same to be verified through MATLAB simulation tool.***

**REFERENCES**

1. H Taub & D. Schilling, Gautam Sahe, Principles of Communication Systems, 3rd Edition, TMH, 2007.
2. Simon Haykin. Principles of Communication Systems, 2nd" Edition, John Wiley

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20CS4L04 | Data Structures Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES**:

**After successful completion of this course, students should be able to**

CO1 : apply recursive and iterative methodologies to solve complex engineering problems.

CO2 : solve searching and sorting techniques and evaluate time & space complexities

CO3 : develop solutions to create and implement operations of linear and nonlinear data structures

CO4 identify and apply suitable data structure for a given real time problem

**LIST OF EXPERIMENTS**

**Exercise 1:**

a Write a recursive C program to calculate Factorial of an integer.

b Write a recursive C program which computes the $n^{th}$ Fibonacci number, for appropriate values of n.

**Exercise 2:**

a. Write a recursive C program to calculate GCD (n, m).

b. Write a recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

**Exercise 3:**

a. Write a C program that implements Selection sort, to sort a given list of integers in ascending order.

b. Write a C program that implements Insertion sort, to sort a given list of integers in ascending order.

**Exercise 4:**

a. Write a C program that implements Quick sort, to sort a given list of integers in ascending order.

b. Write a C program that implements Radix sort, to sort a given list of integers in ascending order.

c. Write a C program that implements Merge sort, to sort a given list of integers in ascending order.

**Exercise 5:**

a. Write a C program that implements Stack (its operations) using arrays.

b. Write a C program that uses Stack operations to convert infix expression into postfix expression.

**Exercise 6:**

a. Write a C program that implements Queue (its operations) using arrays.
b. Write a C program that implements Circular Queue (its operations) using arrays.

**Exercise 7:**

a. Write a C program that uses functions to create a singly linked list and its operations (insert, delete, search).
b. Write a C program to reverse elements of a singly linked list.

**Exercise 8:**

a. Write a C program that implements Stack (its operations) using Linked list.
b. Write a C program that implements Queue (its operations) using Linked list.

**Exercise 9:**

a. Write a C program to create a Circular Linked list and its operations (insert, delete, search).
b. Write a C program to create a Doubly Linked list and its operations (insert, delete, search).

**Exercise 10:**

a. Write a C program to create a Binary Search Tree and its operations.
b. Write a recursive C program for traversing a Binary Search Tree in preorder, in order and post order.

**Exercise 11:**

a. Write a C program to perform BFS traversal on given graph.
b. Write a C program to perform DFS traversal on given graph.

**TEXT BOOKS:**

1. Richard F, Gilberg, Forouzan, Data Structures, 2nd edition, Cengage
2. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J Augenstein, Data Structures usingC, Pearson.
3. Mark Allen Weiss, Data structures and Algorithm Analysis in C, 2nd edition, Pearson Education. Ltd.

**REFERENCE BOOKS:**

1. Jean-Paul Tremblay Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd edition, Mc Graw Hill Higher Education
2. Seymour Lipschutz, Data Structure with C, TMH
3. ReemaThareja, Data Structures using C, 2nd edition, Oxford