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

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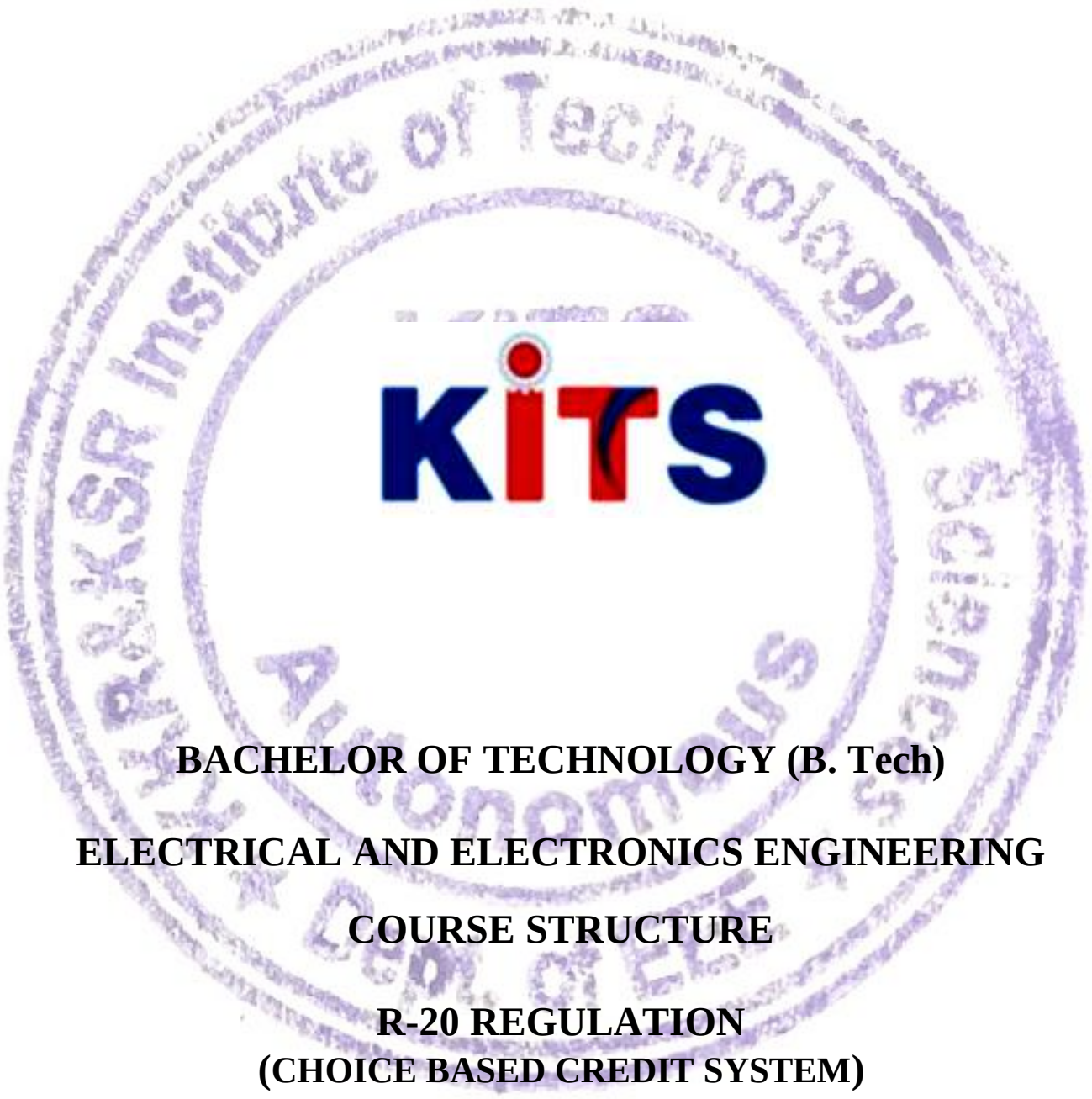
Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh 522017




## BACHELOR OF TECHNOLOGY (B. Tech)

## ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 | 20ME2T02 | Basic of Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5 | 20EE2T01 | Network Analysis | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 6 | 20SH2L04 | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 |
| 7 | 20ME2L01 | Mechanical Engineering 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 ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

### SEMESTER-III

| S. No. | Course Code | Course Title | L | T | P | C |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| 1 | **20SH3T03** | Numerical Methods and Transformations | 3 | 0 | 0 | 3 |
| 2 | 20EE3T01 | Electrical Circuits and Synthesis | 2 | 1 | 0 | 3 |
| 3 | 20EE3T02 | Electromagnetic Fields | 3 | 0 | 0 | 3 |
| 4 | 20EE3T03 | Electrical Machines-I | 3 | 0 | 0 | 3 |
| 5 | **20EC3T04** | Analog Electronics | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 6 | 20EE3L01 | Electrical Circuits and Simulation Lab | 0 | 0 | 3 | 1.5 |
| 7 | 20EE3L02 | Electrical Machines Lab-I | 0 | 0 | 3 | 1.5 |
| 8 | **20EC3L04** | Analog Electronics Lab | 0 | 0 | 3 | 1.5 |
| 9 | 20EE3S01 | MATLAB/Simulink<br>(Basic level Skill Oriented courses-I) | 1 | 0 | 2 | 2.0 |
| 10 | 20GE3M01 | Constitution of Indian | 2 | 0 | 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 | 20EE4T01 | Electrical Machines-II | 3 | 0 | 0 | 3 |
| 2 | 20EE4T02 | Control Systems | 2 | 1 | 0 | 3 |
| 3 | **20EC4T04** | Digital Electronics | 3 | 0 | 0 | 3 |
| 4 | **20CS4T04** | Data Structures | 3 | 0 | 0 | 3 |
| 5 | **20SH4T02** | **Principles of Economics and Management** | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| 6 | 20EE4L01 | Electrical Machines Lab-II | 0 | 0 | 3 | 1.5 |
| 7 | **20EC4L03** | Digital Electronics Lab | 0 | 0 | 3 | 1.5 |
| 8 | **20CS4L04** | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9 | 20EE4S01 | PLC Programming for Automation<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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20ME2T02 | Basic of Mechanical Engineering | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : understand basic laws of thermodynamics and understand the aspects of steam formation and its utilities through the standard steam data tables and charts.

CO2 : classify different types of engines and distinguish them on the basis of their respective working principles

CO3 : understand the working of different types of turbines

CO4 : interpret the application of different manufacturing processes used in the engineering field

CO5 : familiarize with basics of power transmission elements

**SYLLABUS**

**UNIT-I : CONCEPTS OF THERMODYNAMICS**

Introduction, states, concept of work, heat and temperature. Zeroth, First and Second Law of thermodynamics, simple problems on First Law of thermodynamics.

Properties of Steam and use of Steam Tables- T-S and H-S Diagrams. Analysis of various Thermodynamic processes under gone by Steam.

**UNIT-II : INTERNAL COMBUSTION ENGINES**

Classification of IC engines, basic engine components, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency

**UNIT-III : HYDRAULIC, STEAM AND GAS TURBINES**

Classification of Turbines, Working Principle of Hydraulic and Steam turbines –Velocity diagram of Impulse Turbine, Classification of Gas turbine and its functions, methods to improve efficiency of Gas Turbine

**UNIT-IV : MACHINE TOOLS AND MANUFACTURING METHODS**

Lathe: Classification, specification, lathe operations.

Drilling: Classification, working of radial drilling machine, Various operations performed on drilling machines.

Metal joining: arc welding, gas welding, brazing and soldering

**UNIT-V : TRANSMISSION OF POWER**

Belt, rope and chain drives- Different types - power transmission by belts and ropes, initial tensions in the belt.

Gear trains: classification of gears, gear trains velocity ratio, simple, compound –reverted and epicyclic gear trains

**TEXT BOOKS:**

1. Elements of Mechanical Engineering, A.R.Asrani, S.M.Bhatt and P.K.Shah, B.S. Publs.
2. Elements of Mechanical Engineering, M.L.Mathur, F.S.Metha&R.P.Tiwari Jain Brothers Publs., 2009.
3. Thermal Engineering, Ballaney,P.L., Khanna Publishers, 2003.

**REFERENCE BOOKS:**

1. Elements of Mechanical Engineering -K R Gopala Krishna ,Subhas Publications
2. Production Technology by P.N.Rao by I & II McGraw-Hill publications
3. Theory of Machines, S.S. Rattan, Tata McGraw Hil., 2004 & 2009

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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**

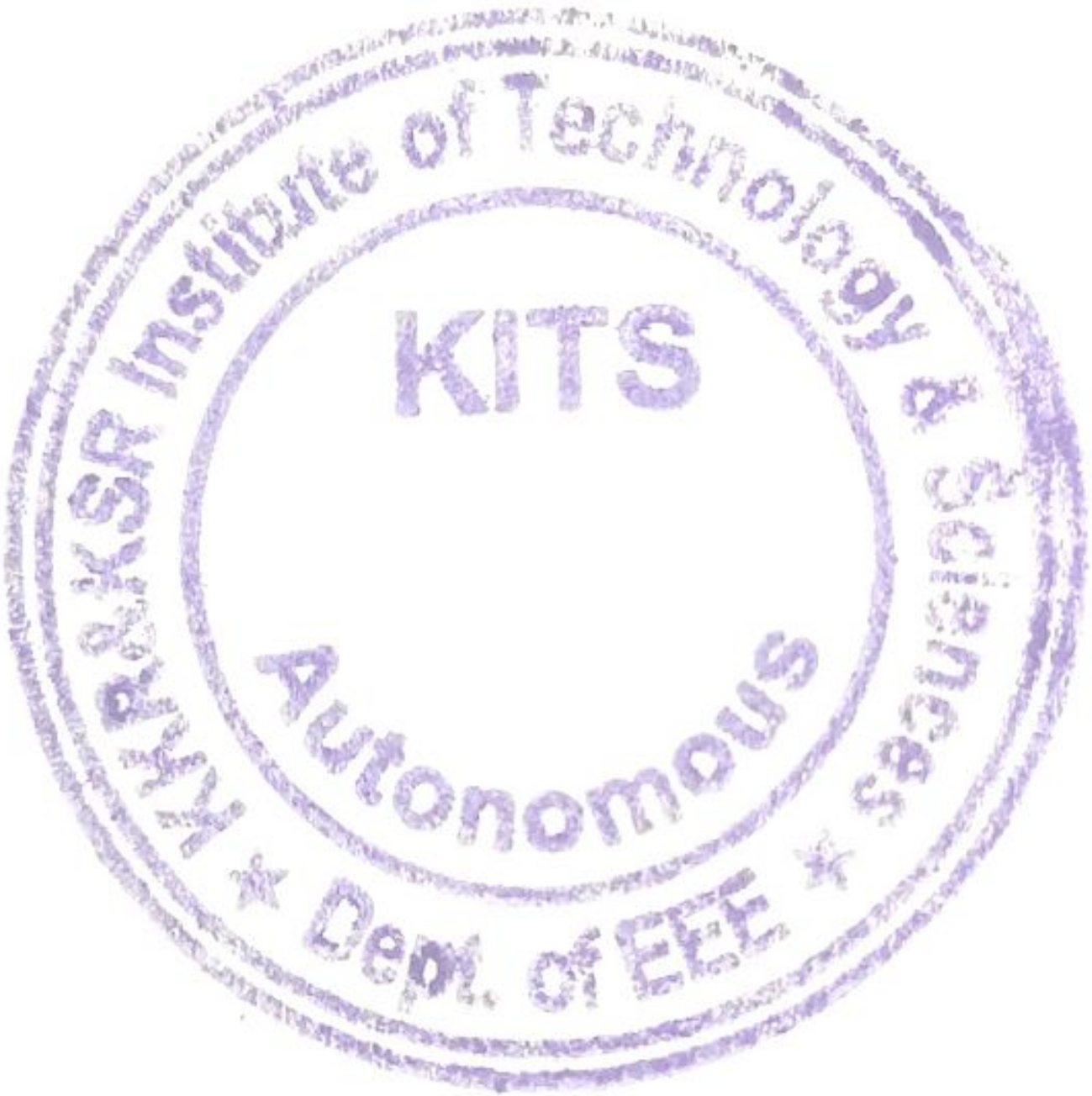
1. Introduction to Chemistry laboratory – Molarity, normality, primary, secondary standard solutions, volumetric titrations, quantitative analysis
2. Estimation of HCl using standard $Na_2CO_3$ solution.
3. Estimation of alkalinity of a sample containing $Na_2CO_3$ and NaOH.
4. Estimation of total hardness 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 ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: II**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20ME2L01 | Mechanical Engineering Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

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

CO1 : identify tools and techniques used for sheet metal fabrication.

CO2 : identify various operations performed on lathe and drilling machines.

CO3 : use arc and gas welding equipment.

CO4 : outline the valve timing diagram and port timing diagram of ic engines.

CO5 : explain the different parts of an engine, locations and there working

**LIST OF EXPERIMENTS**

1. Sheet metal work
   Preparation of sheet metal models:
   a. Cylinder
   b. Hexagonal prism with soldering
   c. Funnel
2. Plain Turning on Lathe Machine
3. Step Turning on Lathe Machine
4. Drilling and Tapping
5. Metal arc welding
   a. Lap joint
   b. Butt joint
6. Gas welding
   a. Lap joint
   b. Butt joint
7. I.C. Engines valve and port timing diagrams
8. Demonstration on Cut section of IC Engine.
9. Demonstration on Water turbines.
10. Demonstration of additive Manufacturing

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE3T01 | Electrical Circuits and Synthesis | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : solve the three phase circuits under balanced & unbalanced conditions.

CO2 : analyze the transient response of electrical circuits for DC excitation.

CO3 : analyze the transient response of electrical circuits for AC excitation.

CO4 : determine the different parameters of two port network.

CO5 : realize the electrical equivalent network for a given network transfer function.

**SYLLABUS**

**UNIT-I : Three Phase Circuits**

**Balanced Three Phase Circuits:** Phase Sequence –Relation Between Line and Phase Voltages, and Currents in Star and Delta Connected System-Analysis of Balanced Three Phase System-Measurement of Active and Reactive Power in Three Phase Systems-Problem Solving.

**Unbalanced Three Phase Circuits:** Analysis of Three Phase Unbalanced System-Loop Method – Star –Delta Transformation Technique-Two Wattmeter Method for Measurement of Three Phase Power-Problem Solving.

**UNIT-II : Transient Analysis in DC Circuits**

Transient Response of R-L, R-C, R-L-C Circuits for DC Excitations, Solution Using Differential Equations and Laplace Transforms-Problem Solving.

**UNIT-III : Transient Analysis in AC Circuits**

Transient Response of R-L, R-C, R-L-C Circuits for AC Excitations, Solution Using Differential Equations and Laplace Transforms-Problem Solving.

**UNIT-IV : Two Port Networks**

Two Port Network Parameters –Z, Y, ABCD and Hybrid Parameters and their Relations, Cascaded Networks-Pole and Zeros of Network Functions-Problem Solving.

**UNIT-V : Network Synthesis**

Positive Real Function - Basic Synthesis Procedure - LC Immittance Functions- RC Impedance

Functions and RL Admittance Function – RL Impedance Function and RC Admittance Function - Foster and Cauer Methods.

**TEXT BOOKS:**

1. William Haytand Jack E. Kemmerley, Engineering circuit analysis McGraw Hill Company, 8th ed., 2013
2. Van Valkenburg, Network synthesis, Prentice-Hall of India Private Ltd, 3rd ed., 2019

**REFERENCE BOOKS:**

1. A. Sudhakar, Shyammohan S. Pillai, Networks Analysis, 4th ed., McGraw-Hill Companies, 2017.
2. A. Bruce Carlson, Circuits, Cengage Learning Publications, 1st ed., 2011.
3. Smarajit Ghosh, Network Theory Analysis and Synthesis, PHI publications
4. D. Roy Choudhury, Networks and Systems, New Age International publishers, 2nd ed., 2013.
5. David A. Bell, Electric Circuits, Oxford publications, 7th ed., 2009
6. A. Chakrabarthi, Circuit Theory Analysis and Synthesis, 7th Revised ed., Dhanpat Rai & Co, 2018.
7. Charles K. Alexander, Mathew N. O. Sadiku, Fundamentals of Electric Circuits, 6th ed., Mc Graw Hill, 2019.
8. Electric Circuits, 5E (Schaum's Outline Seris) (Sie). The United Kingdom, McGraw-Hill Education (India) Pvt Limited

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE3T02 | Electromagnetic Fields | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : determine electric field intensity and electric potential using Gauss's law

CO2 : calculate magnetic field intensity due to current

CO3 : apply ampere' s law, and the Maxwell' s second and third equations in static magnetic field

CO4 : analyze the magnetic forces and torque produced by currents in magnetic field

CO5 : understand the concept of time varying fields and calculate induced EMF's

**SYLLABUS**

**UNIT-I : Electrostatics**

Coulomb's Law, Electric Field Intensity, Electrical Field Intensity Due to Point Charges. Line, Surface and Volume Charge Distributions. Maxwell's First Equation $\mathrm{div}(D) = \rho v$, Gauss Law and Its Applications. Potential Difference, Calculation of Potential Differences for Different Configurations, Conservative of Electric Fields, Maxwell's Second Equation Curl (E)=0, Electric Dipole, Electrostatic Energy and Energy Density.

**UNIT-II : Current and Conductors, Dielectrics and Capacitance**

Polarization- Current and Current Density, Ohms Law in Point Form, Continuity of Current, Boundary Conditions of Perfect Dielectric Materials. Capacitance- Capacitance of a Two Wire Line, Poisson's Equation, Laplace's Equation.

**UNIT-III : Magnetostatics**

Biot-Savart's Law, Oersted 's Experiment -Ampere's- Circuital Law, Magnetic Flux, Magnetic Field Intensity and Magnetic Flux Density, MFI Due to a Straight Current Carrying Filament – MFI Due to Circular, Square and Solenoid Current – Carrying Wires, Maxwell's Third Equation $\mathrm{Curl}(H) = Jc$.

**UNIT-IV : Magnetic Forces, Materials and Inductance**

Force on a Moving Charge, Force on a Differential Current Element, Force Between Differential Current Elements, Nature of Magnetic Materials, Magnetization and Permeability, Magnetic

Boundary Conditions, Magnetic Circuits, Self-Inductances and Mutual Inductances, Maxwell's Fourth Equation $\text{Curl}(E) = \partial B/\partial t$ .

**UNIT-V : Time Varying Fields and Maxwell's Equations**

Faraday's Law for Electromagnetic Induction, Displacement Current, Modified Maxwell's Equation in Differential and Integral Forms. Statically and Dynamically Induced EMF's, Maxwell's Equations for Time Varying Fields.

**TEXT BOOKS:**

1. M. N. O. Sadiku, Elements of Electromagnetics, Oxford University Publication, 2014.
2. W.H. Hayt , J.A Buck, Engineering Electromagnetics, McGraw Hill Education, 2006.

**REFERENCE BOOKS:**

1. A. Pramanik, Electromagnetism-Problems with solution, Prentice Hall India, 2012.
2. A. Pramanik, Electromagnetism - Theory and applications, PHI Learning Pvt. Ltd, New Delhi, 2009.
3. Yaduvir Singh, Electromagnetic Field Theory, 1st ed., Pearson 2011.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE3T03 | Electrical Machines-I | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : demonstrate the principle, construction, operation and characteristics of DC machines.

CO2 : determine the performance of DC machine through different methods

CO3 : distinguish different types of speed control methods of DC machine

CO4 : demonstrate the construction and operation of two winding transformer

CO5 :
a. analyze the performance of single-phase transformer
b. demonstrate the operation of three phase transformer
c. achieve three-phase to two phase transformation

**SYLLABUS**

**UNIT-I : Electromechanical Energy Conversion and introduction to DC machines**

Principles of electromechanical energy conversion – singly excited and multi excited system – Calculation of force and torque using the concept of co-energy.

Construction and principle of operation of DC machine – EMF equation for generator – Classification of DC machines based on excitation – OCC of DC shunt generator- Problem Solving.

**UNIT-II : Performance of D.C. Machines**

Torque and back-emf equations of dc motors– Armature reaction and commutation –characteristics of separately-excited, shunt, series and compound motors - losses and efficiency- applications of dc motors.

**UNIT-III : Starting, Speed Control and Testing of DC Machines**

Necessity of starter – Starting by 3 point and 4-point starters – Speed control by armature

voltage and field control – testing of DC machines - brake test, Swinburne's method – principle of regenerative or Hopkinson's method - retardation test -- separation of losses- Problem Solving.

**UNIT-IV : Single Phase Transformers**

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

circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.

**UNIT-V : Testing of Transformers and 3-Phase Transformers**

Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses- parallel operation with equal voltage ratios – auto transformer –comparison with two winding transformers-- Problem Solving.

Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ – Scott connection.

**TEXT BOOKS:**

1. P. S. Bhimbra, Electrical Machinery, 7th ed., Khanna Publications, 2007.
2. S. K. Bhattacharya, Electrical Machines, 3rd ed., Tata McGraw-Hill Education, 2010.
3. A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, Electric Machinery, 6th ed., The McGraw-Hill Companies, 2017.
4. Abhijit Chakrabarti and Sudipta Nath, Electrical Machines, 6th ed., McGraw Hill Education (India) Pvt. Ltd, 2015.

**REFERENCE BOOKS**:

1. I. L. Kosow, Electrical Machinery and Transformers, 2nd ed., Pearson Education, 2007.
2. I. J Nagarath. and D. P Kothari, Electrical Machines, 5th ed., TMH Publishing Co. Ltd. New Delhi, 2017.
3. J. B. Guptha, Theory & Performance of Electrical Machines, S. K. Kataria & Sons, 2009.
4. B. S. Guru and H. R Hiziroglu, Electrical Machinery and Transformers, 3rd ed., Oxford University Press, 2012.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC3T04 | Analog Electronics | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : understand the concepts of the diode and its operation

CO2 : identify the appropriate diode for an application and designing a solution

CO3 : identify the suitable transistor and its configuration that applies to give a solution for a problem.

CO4 : understand the concepts of op-amp and its operation

CO5 : identify the required IC to design and fulfil the given requirement.

**SYLLABUS**

**UNIT-I : Diodes and Their Applications**

p-n junction diode, energy band diagram of PN junction Diode, Open circuited p- n junction, Biased p-n junction, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, Diode Applications-Rectifier, Switch, Clipper and Clamper

**UNIT-II : Special Diodes Applications**

Zener Diode, Breakdown mechanisms, Zener diode applications, LED operation and applications, Photodiode operation and applications, Tunnel Diode operation and applications, UJT operation and applications, Varactor Diode operation and applications SCR operation and applications, Any one applications of LED with Photo Diode

**UNIT-III : Transistor and Applications**

**Transistor:** Unipolar Junction Transistors-Bipolar junction Transistors.

**BJT:** Transistor current components, transistor equation, transistor configurations, Relation between α, β and γ, Transistor as an amplifier, Transistor as a switch, characteristics of Transistor in Common Base, Common Emitter and Common Collector configurations

**FET:** FET types, construction, operation, characteristics μ, gm, rd parameters, JFET as an Amplifier, JFET as Switch, JFET as Variable Resistor, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

**UNIT-IV : Operational Amplifier and Applications**

OP-Amp Block Diagram (Symbolic Representation), Characteristics of Op-Amp, Ideal and Practical Op-Amp specifications, DC and AC Characteristics, Definitions of Input and Output Off-set voltage and currents slow rate, CMRR,741 Pin diagram.

Op-Amp as Inverting Amplifier, Non-Inverting Amplifier, Adder, differential Amplifier, Instrumentational Amplifier, Comparator, wave generators (Oscillators and Mutlivibrators)

**UNIT-V : Timers, VCO, Voltage Regulators & Phase Locked Loops**

**555 Timer**: Introduction to 555 timer, functional diagram, Applications, Monostable and Astable operations and applications, Schmitt Trigger.

**78XX: Three**-Terminal Voltage Regulators operation and applications

**566 IC: -**Pin diagram, functional diagram, operation and applications.

**565 IC:** Pin diagram, functional diagram, operation and applications.

**TEXT BOOKS:**

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition,2007
2. Electronic Devices and Circuits-K. Lal Kishore, BS Publications, FourthEdition,2016.
3. Electronics devices & circuit theory- Robert L.Boylestad and Loui Nashelsky, Pearson/Prentice hall, tenth edition,2009
4. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p)Ltd, 2nd Edition,2003.
5. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.
6. Linear Integrated Circuits by Salivahan-3rd-Edition, McGrawHill,2018

**REFERENCES:**

1. Integrated Electronics-J. Millman, C. Halkias,Tata Mc-Graw Hill, SecondEdition,2009
2. Electronic Devices and Integrated Circuits – B.P. Singh,Rekha , Pearson publications,
3. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, 4th Edition,2008.
4. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma; SK Kataria & Sons; 2nd Edition,2010
5. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition,2000.
6. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition,2011.
7. Linear Integrated Circuits, by Ganesh Babu T.R and Suseela B. Scitech, 5th -Editon, 2014.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE3L01 | Electrical Circuits and Simulation Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

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

CO1 : determine self and mutual inductances, and resonance frequency

CO2 : solve dc circuits using network theorems

CO3 : calculate three phase power and power factor.

CO4 : compute two port parameters of a given electric circuits

CO5 : simulate

a. the Frequency and Time Response of 2nd Order System Using MATLAB.
b. the network theorems using PSPICE

**SYLLABUS**

**LIST OF EXPERIMENTS**

**Note: Minimum 10 Experiments mandate**

**Part-A (Minimum six)**

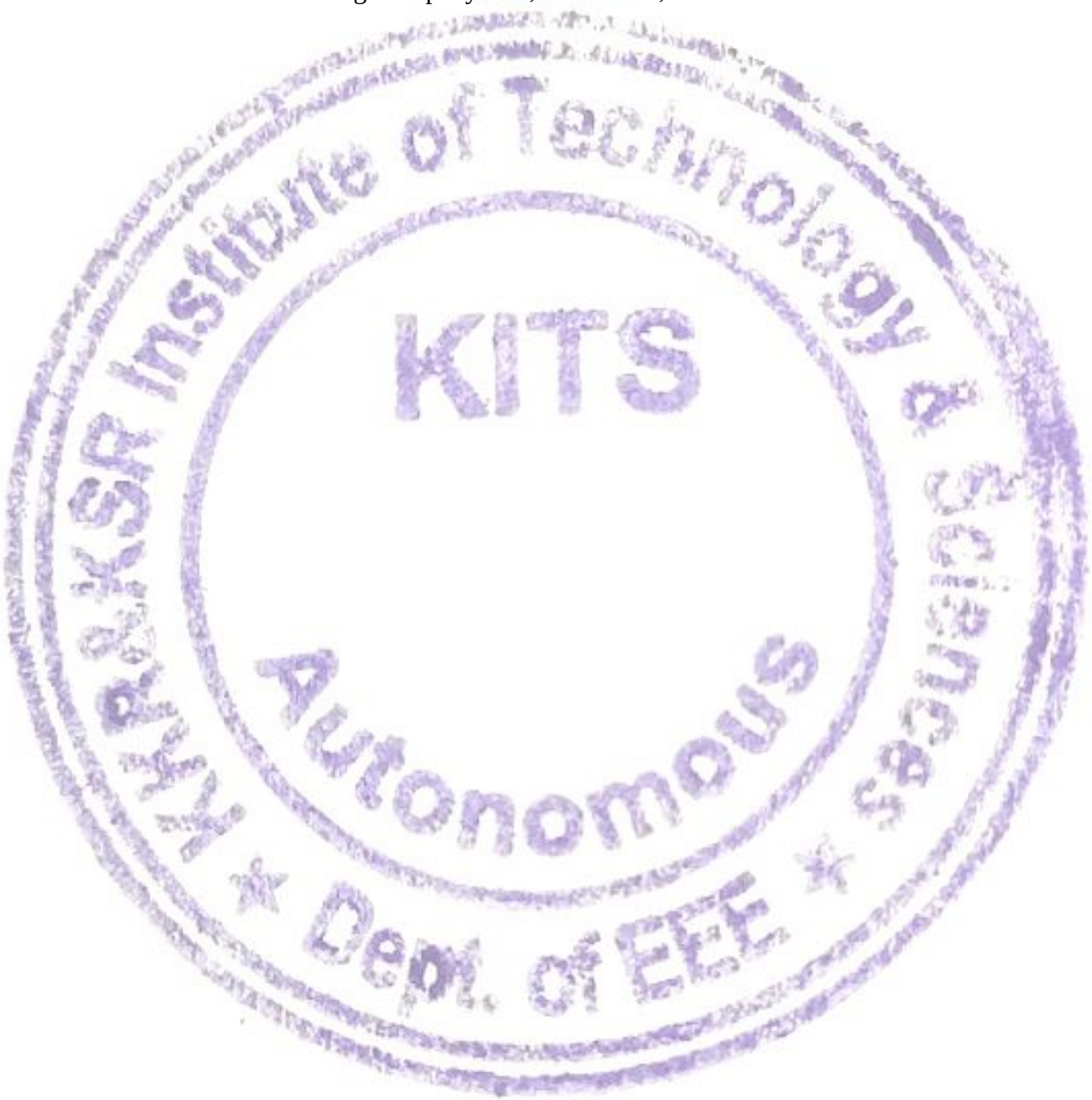
1. Determination of Self, Mutual Inductances and Coefficient of Coupling.
2. Series and Parallel Resonance
3. Experimental Determination of Thevenin's Equivalent
4. Experimental Determination of Norton's Equivalent.
5. Verification of Maximum Power Transfer Theorem
6. Verification of Compensation Theorem.
7. Verification of Reciprocity and Millimann's Theorems.
8. Three Phase Power Measurement by two wattmeter method for unbalanced loads.
9. Three Phase Reactive Power Measurement with Single-Phase Wattmeter.
10. Calculate Impedance and Admittance Parameters of Two-Port Network.
11. Calculate transmission and hybrid Parameters of Two-Port Network.

**Part-B (Minimum four)**

1. Simulation of Frequency Response of Second Order RLC Circuit Using MATLAB
2. Simulation of Time Response of Second Order RLC Circuit Using MATLAB
3. Verification of Network Theorems Using PSPICE

**REFERENCES BOOKS:**

1. Laboratory Manual
2. A. Sudhakar, and S. P, Shyam Mohan, Circuits and Networks: Analysis and Synthesis, 4th ed., Tata McGraw Hill Publishing Company Ltd., New Delhi, 2010.



## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE3L02 | Electrical Machines Lab-I | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

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

CO1 : determine and predetermine the performance of DC machines

CO2 : draw magnetizing characteristics of DC generator and control the speed of DC motor.

CO3 : analyze the performance and losses by testing of the DC machines

CO4 : determine and predetermine the performance of transformers

CO5 : realize three-phase to two phase transformation.

**LIST OF EXPERIMENTS**

1. Open Circuit Characteristics of DC Generator (Self and Separately Excited)
2. Load Test on DC Generators.
3. Speed control of D.C. motors using armature control and field control methods
4. a) Brake Test on D.C. Shunt Motor
   b) Brake Test on D.C. Series Motor
5. Swinburne's test
6. Hopkinson test on two identical D.C. machines
7. Retardation test on DC shunt motor
8. Field test on D.C. Series machines.
9. Separation of losses in DC Machine.
10. a) Open circuit & Short circuit test on single phase transformer
    b) Load test on single phase transformer.
11. Sumpner's test on two single phase transformers
12. Separation of core losses of a single-phase transformer
13. Parallel operation of Single-Phase Transformers
14. Scott connection of single-phase transformers

**Note: Any ten experiments mandate**

**REFERENCE(S)**

1. Laboratory Manual.
2. S. K. Bhattacharya, Electrical Machines, 3rd ed., Tata McGraw-Hill Education, 2010.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC3L04 | Analog Electronics Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES**:

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

CO1 : understand the concepts of the diode and its operation

CO2 : identify the appropriate diode for an application and designing a solution

CO3 : identify the suitable transistor and its configuration that applies to give a solution for a problem.

CO4 : understand the concepts of op-amp and its operation

CO5 : identify the required IC to design and fulfil the given requirement.

**LIST OF EXPERIMENTS**

**Note: Minimum of 10 Experiments mandate**

**PART-A (Any six experiments)**

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 half wave & full wave rectifier and compare ripple factor with and without filter
4. Design a Clipper circuit with diodes.
5. Common emitter configuration characteristics.
6. Common base configuration characteristics.
7. Transistor as an amplifier.
8. Transistor as a switch
9. JFET common source configuration characteristics
10. FET as an amplifier.
11. FET as a switch

**PART-B (Any four experiments)**

1. Adder and Subtractor using 741 Op-Amp
2. Comparator using 741 Op-Amp
3. Wein Bridge Oscillator using 741 Op-Amp.
4. Astable multi vibrator using 555 IC

5. Monostable multi vibrator using 555 IC
6. Operation 0f 78XX voltage regulators.
7. Any on application of 566 IC
8. Any on application of 565 IC

**TEXT BOOKS:**

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition,2007
2. Electronic Devices and Circuits-K. Lal Kishore, BS Publications, FourthEdition,2016.
3. Electronics devices & circuit theory- Robert L.Boylestad and Loui Nashelsky, Pearson/Prentice hall, tenth edition,2009
4. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p)Ltd, 2nd Edition,2003.
5. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.
6. Linear Integrated Circuits by Salivahan-3rd-Edition, McGrawHill,2018

**REFERENCES:**

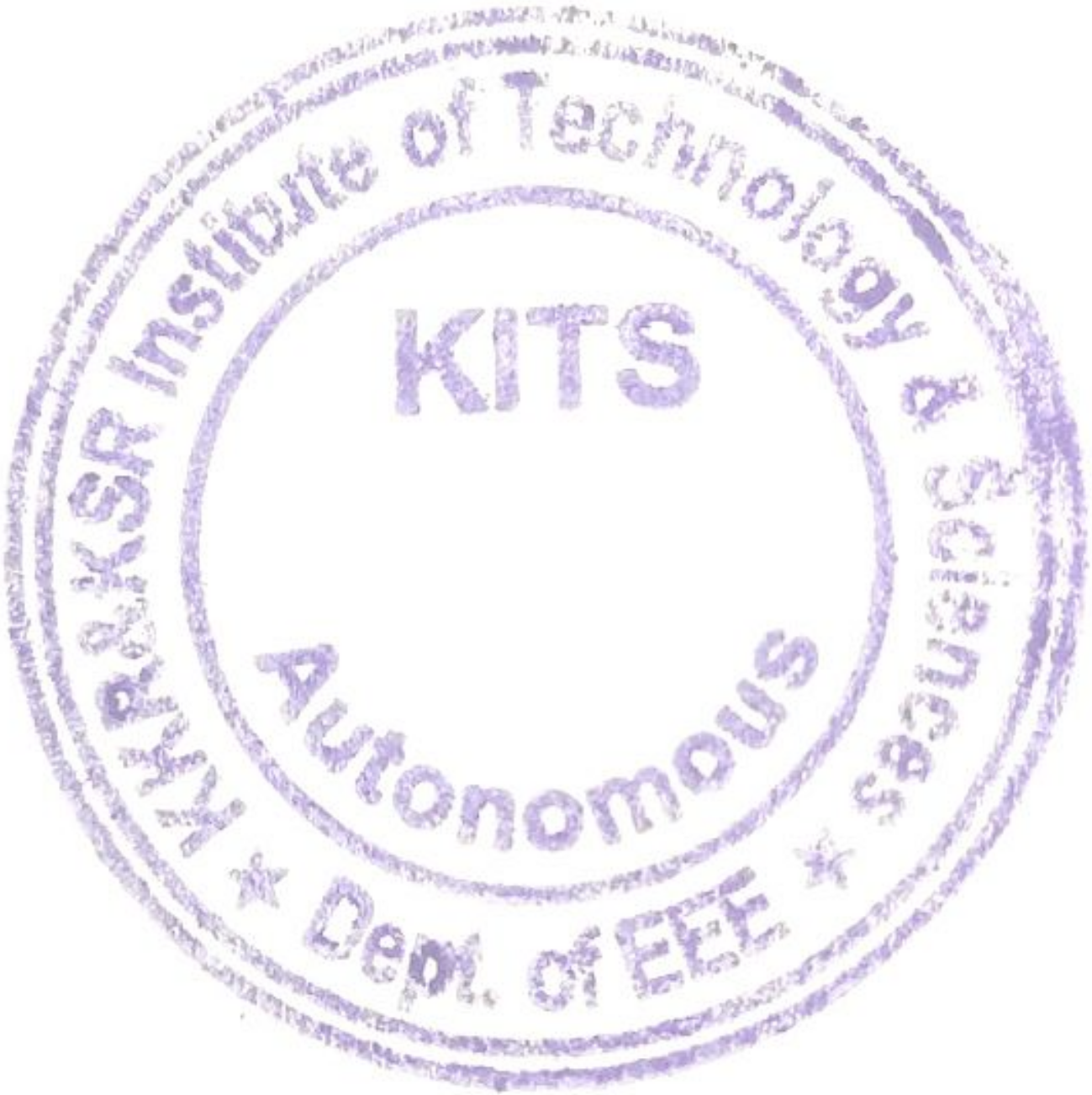
1. Integrated Electronics-J. Millman, C. Halkias,Tata Mc-Graw Hill, SecondEdition,2009
2. Electronic Devices and Integrated Circuits – B.P. Singh,Rekha , Pearson publications,
3. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, 4th Edition,2008.
4. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma; SK Kataria& Sons; 2nd Edition,2010
5. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition,2000.
6. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition,2011.
7. LinearIntegrated Circuits, by Ganesh Babu T.R and Suseela B. Scitech, 5th -Editon, 2014.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: III**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE3S01 | MATLAB/Simulink | 1 | 0 | 2 | 2 |



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE4T01 | Electrical Machines-II | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : explain the operating characteristics three phase induction machines.

CO2 : distinguish different method of starting and speed control of three induction machines.

CO3 : explain the construction an operating characteristic of a synchronous generator

CO4 : demonstrate the principal operation, characteristics and the phenomenon of synchronous motor

CO5 : differentiate the starting methods of single-phase induction motor

**SYLLABUS**

**UNIT-I : Three Phase Induction Motors**

Introduction-Construction Details of Cage and Wound Rotor Machines - Production of Rotating Magnetic Field -Principle of Operation - Rotor EMF and Rotor Frequency - Rotor Current and Power Factor at Standstill and During Running Conditions - Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and their Interrelationship – Equivalent Circuit – Phasor Diagram-Problem Solving.

**UNIT-II : Characteristics, Starting and Testing Methods of Induction Motors**

Torque Equation - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic - Double Cage and Deep Bar Rotors - Crawling and Cogging – Speed Control of Induction Motor With *V/f* Method – No Load and Blocked Rotor Tests - Circle Diagram for Predetermination of Performance– Methods of Starting – Starting Current and Torque Calculations – Induction Generator Operation (Qualitative Treatment Only).

**UNIT-III : Synchronous Generators**

Introduction-Constructional Features of Alternators –Principle of Operation –Winding Factors-EMF Equation- Synchronous Reactance-Armature Reaction—Predetermination of Voltage Regulation Using E.M.F, M.M.F, Potier Triangle and ASA Methods–Parallel Operation–Synchronizing Power-Active and Reactive Power Sharing-Alternator on Infinite Bus Bars-Salient Pole Synchronous Machine –Two Reaction Theory-Slip Test–Operating Characteristics-Capability Curves-Problem

Solving.

**UNIT-IV : Synchronous Motor**

Introduction-Constructional Features of synchronous Motor – Principle of Operation- Methods of Starting–Torque and Power Developed Equations–Effect of Change in Excitation and Load on Synchronous Motor-V Curves and Inverted V Curves–Hunting and Suppression Methods-Synchronous Condenser-Problem Solving.

**UNIT-V : Single Phase Induction Motor**

Introduction – Constructional Features and Theory of Operation – Equivalent Circuit-Performance Characteristics- Starting Methods, Shaded Pole Motor-Reluctance Motor - Hysteresis Motors-Stepper Motor-AC Series Motor.

**TEXT BOOKS:**

1. P. S. Bimbhra, Electric Machines, 2nd ed., Khanna Publishing, 2017.
2. M. G. Say, The Performance and Design of Alternating Current Machines: Transformers, Three-Phase Induction Motors and Synchronous Machines. India, CBS Publishers & Distributors, 2005.

**REFERENCE BOOKS:**

1. J. J. Nagrath and D.P. Kothari, Electric Machines, 4th ed., McGraw Hill Education, 2010
2. V. K Mehta, Rohit Mehta, Principle of Electrical Machines, 2nd ed., S Chand and Company Ltd., 2019.
3. Chakrabarthi and S. Debnath, Electrical Machinery, 1st ed., McGraw Hill, 2015
4. Stephen J Chapman, Electrical Machinery Fundamentals, 5th ed., McGraw Hill Education, 2011

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC4T04 | Digital Electronics | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : understand the concepts of logic gates and minimization of Boolean equations

CO2 : identify the appropriate combinational circuit based on its operation for an application and designing a solution

CO3 : design counters and registers that applies to give a solution for a problem.

CO4 : know the diode and transistor switching characteristics

CO5 : understand sampling gates and to design NAND and NOR gates using various logic families.

**SYLLABUS**

**UNIT-I : Logic Gates and Boolean Algebra**

Number systems, Conversion of Number Systems, Error detection & correction codes: parity checking, even parity, odd parity, Hamming code. Logic gates, Universal gates, Representation of all gates with universal logic gates, Standard SOP and POS Forms, Boolean theorems Minimization and realization of switching functions using Boolean theorems, K-Map, duality.

**UNIT-II : Combinational Logic Circuits Design**

Combinations circuit definition, Design process, Adders(half adder, full Adder, 4-bit adder), Subtractor( half subtractor, full subtractor, 4-bit subtractor), Comparator (Single bit, two bit), Decoder( 2 x 4, 3 x 8, 4 x 8 with 2 x 4 and 3 x 8), encoder, priority encoder, Multiplexer ( 2 x 1, 4 x 1, 8 x 1 , 8 x 1 with 4 x 1 and 2 x 1) , Seven Segment Decoder

**UNIT-III : Sequential Circuits**

Sequential circuit definition, Clock signal, Triggering, latches , flip flops, RS-flip flop, JK- Flip flop, D – Flip flop, T-Flip flop, Conversion from one flip-flop to another flip- flop, Counters, design of synchronous counters and asynchronous counter , Johnson counter, ring counter, Mod-6 Counter and Mod-10 Counter, Registers and shift registers.

**UNIT-IV : Switching Characteristics of Devices**

Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, break down voltage

consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor switching times.

**UNIT-V : Digital Logic Gate Circuits**

Digital Logic gate circuits: Sampling gates, Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits, Comparison of logic families.

**TEXT BOOKS:**

1. Switching and finite automata theory Zvi. Kohavi, Niraj.K.Jha 3rd Edition, Cambridge UniversityPress,2009
2. Digital Design by M. Morris Mano, Michael D Ciletti,4th edition PHIpublication,2008
3. Switching theory and logic design by Hill and Peterson**,** Mc-Graw Hill TMH edition, 2012.
4. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
5. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002.

**REFERENCES:**

1. Fundamentals of Logic Design by Charles H. Roth Jr, JaicoPublishers,2006
2. Digital electronics by R S Sedha. S.Chand & companylimited,2010
3. Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengage learning,2006.
5. 1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005. 2. Wave Generation and Shaping - L. Strauss.
6. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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 ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20SH4T02** | **Principles of Economics & Management** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : adopts the Managerial Economic concepts for decision making and forward planning. Also know law of demand andits exceptions, to use different forecasting methods for predicting demand for various products and services.

CO2 : assess the functional relationship between Production andfactors of production and list out various costs associated withproduction and able to compute BEP and significance of BEA.

CO3 : outline the different types of business organizations and provide a basic insight into national economical activities.

CO4 : familiarize with the concepts of management and to provide basic insight into management practices.

CO5 : provide conceptual knowledge on functional management.

**SYLLABUS**

**UNIT-I : Introduction to Managerial Economics & Demand**

Definition, Nature and Scope of Managerial Economics.

**Demand Analysis**: Definition-types of demand - DemandDeterminants, Law of Demand and its exceptions.

**Elasticity of Demand:** Definition, Types, Significance of Elasticity of Demand. Demand Forecasting: definition, methods of demand forecasting (survey methods, statistical methods, expert opinionmethod, test marketing, controlled experiments, judgmental approachto demand forecasting)

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

**Production Function** – Law of Variable Proportion, Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns.

**Cost Analysis**: Types of Cost, Break-even Analysis (BEA)- Determination of Break-Even Point (Simple numerical problems) - Managerial Significance and limitations of BEA.

**UNIT-III : Business Environment**

Features of Business Organization, Sole Proprietorship, Partnership and Joint Stock Company, Steps for formation and Registration of the company.

Monetary Economics: Inflation, GDP, Per-capita Income.

**UNIT-IV : Introduction to Management**

Concept –nature and importance of Management –Generic Functions of Management – Evolution of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- Leadership – styles.

**UNIT-V : Functional Management**

Concept of HRM, HRD and PMIR- Functions of HR Manager – Job Evaluation and Merit Rating. Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

**TEXT BOOKS:**

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
4. Dr. A. R. Aryasri, Management Science' TMH 2011.

**REFERENCES:**

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Robins, Stephen P., Fundamentals of Management, Pearson, India.
6. Kotler Philip & Keller Kevin Lane: Marketing Management 12/e, PHI,2007

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EE4L01** | **Electrical Machines Lab-II** | **0** | **0** | **3** | **1.5** |

**COURSE OUTCOMES:**

**After Successful Completion of this Course, Students Should be able to**

CO1 : draw the operating characteristics of three phase induction machines.

CO2 : calculate the regulation of synchronous generator by using different methods.

CO3 : analyze the performance of synchronous motor.

CO4 : determine the equivalent circuit parameters of single-phase induction motor.

CO5 : draw the performance characteristics of single-phase AC series motor.

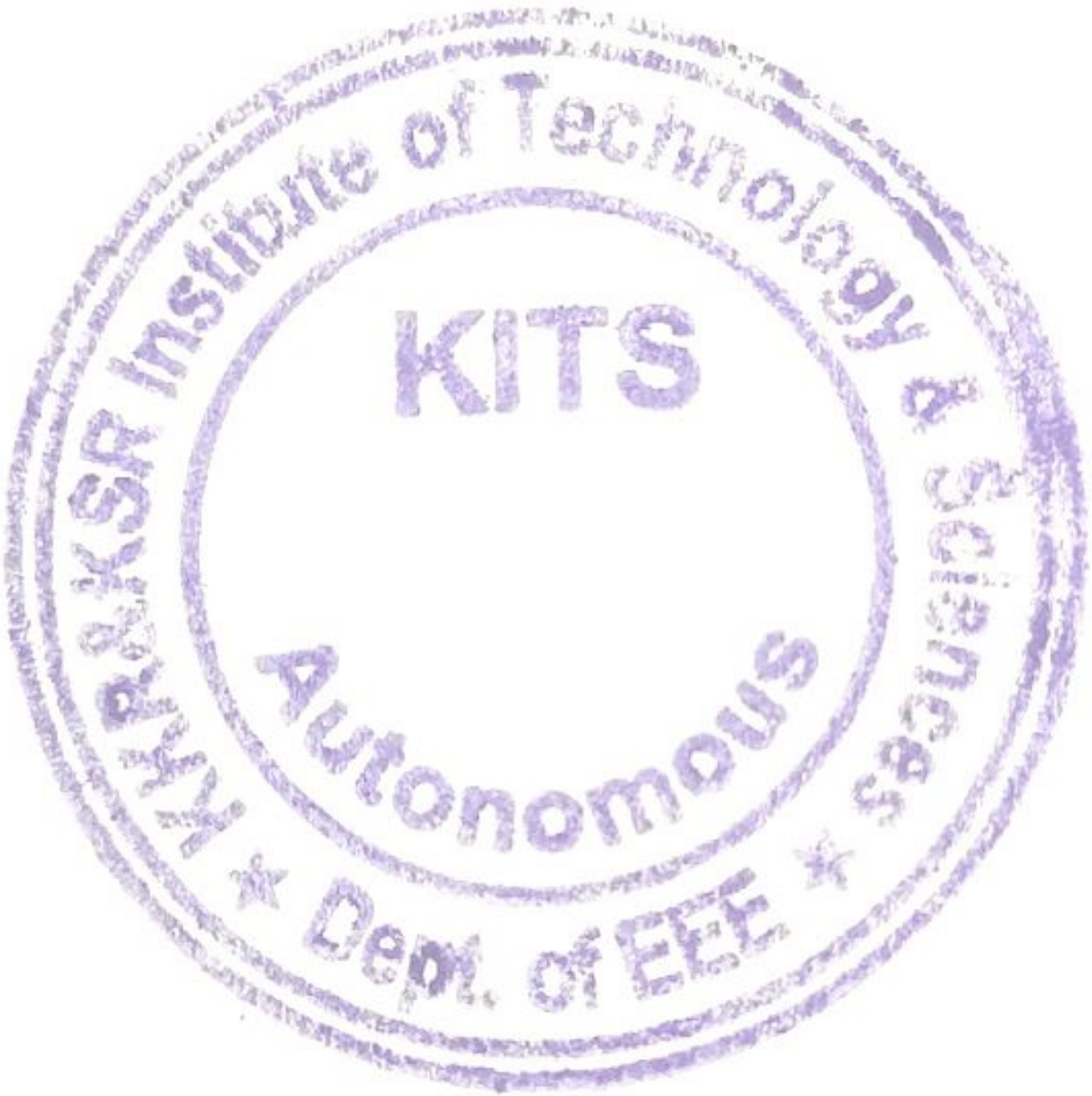
**LIST OF EXPERIMENTS**

1. Brake test on three phase induction motor
2. No–load & blocked rotor tests on three phase induction motor
3. Speed control of induction motor by v/f method.
4. Regulation of a three –phase alternator by synchronous impedance (EMF) & MMF methods
5. Regulation of three–phase alternator by Potier triangle method
6. Determination of efficiency of three-phase alternator by loading with three phase induction motor
7. Parallel operation of three-phase alternator.
8. V and inverted V curves of a three—phase synchronous motor.
9. Determination of $X_d$ and $X_q$ of a salient pole synchronous machine
10. Equivalent circuit of single-phase induction motor
11. Power factor improvement of single-phase induction motor by using capacitors and load test on single-phase induction motor.
12. Brake test on single-phase ac series motor.
13. Starting methods of a capacitor start and capacitor start run single-phase induction motor.
14. Brake test on single-phase induction motor.

**Note: Minimum 10 experiments mandate**

**REFERENCE(S)**

1. Laboratory Manual.
2. J. J. Nagrath and D.P. Kothari, Electric Machines, 4th ed., McGraw Hill Education, 2010
3. S. K. Bhattacharya, Electrical Machines, 3rd ed., Tata McGraw-Hill Education, 2010.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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC4L03 | Digital Electronics Lab | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES**:

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

CO1 : understand the concepts of logic gates and minimization of Boolean equations

CO2 : identify the appropriate combinational circuit based on its operation for an application and designing a solution

CO3 : design counters and registers that applies to give a solution for a problem.

CO4 : know the diode and transistor switching characteristics

CO5 : understand sampling gates and to design NAND and NOR gates using various logic families.

**LIST OF EXPERIMENTS**

**Note: Minimum of 10 Experiments mandate.**

**PART-A (minimum seven experiments)**

1. Verification of truth tables of Logic gates Two input OR, AND, NOR, NAND, Exclusive, Exclusive NOR.
2. Design a simple combinational circuit with three variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
3. Design a half adder /full adder and verify the truth table
4. Design a four-bit adder and verify the functionality with different inputs
5. Design a four-bit subtractor and verify the functionality with different inputs
6. Verification of functional table of 3 x 8-line Decoder
7. Verification of functional table of 8 x 1 MUX.
8. Draw the circuit diagram of a single bit comparator and test the output
9. Construct 7 Segment Display Circuit Using 7 segment Decoder.
10. Verification of functional tables of JK flip flop
11. Verification of functional tables of T- flip flop
12. Verification of functional tables of D- flip flop
13. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
14. Design MOD – 8 synchronous counters

**PART-B (minimum three experiments)**

1. Calculate diode switching times
2. Transistor as inverter/not gate
3. Calculate transistor switching times
4. Realization of Logic Gates using DTL or TTL logic circuits
5. Realization of Logic Gates using ECL or CMOS logic circuits
6. Sampling Gates

**TEXT BOOKS:**

2. Switching and finite automata theory Zvi. Kohavi, Niraj.K.Jha 3rd Edition, Cambridge UniversityPress,2009.
3. Digital Design by M. Morris Mano, Michael D Ciletti,4th edition PHIpublication,2008.
4. Switching theory and logic design by Hill and Peterson**,** Mc-Graw Hill TMH edition, 2012.
5. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
6. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002.

**REFERENCES:**

1. Fundamentals of Logic Design by Charles H. Roth Jr, JaicoPublishers,2006.
2. Digital electronics by R S Sedha. S.Chand & companylimited,2010
3. Switching Theory and Logic Design by A. Anand Kumar, PHI Learning pvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengage learning,2006.
5. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005. 2. Wave Generation and Shaping - L. Strauss.
6. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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:**

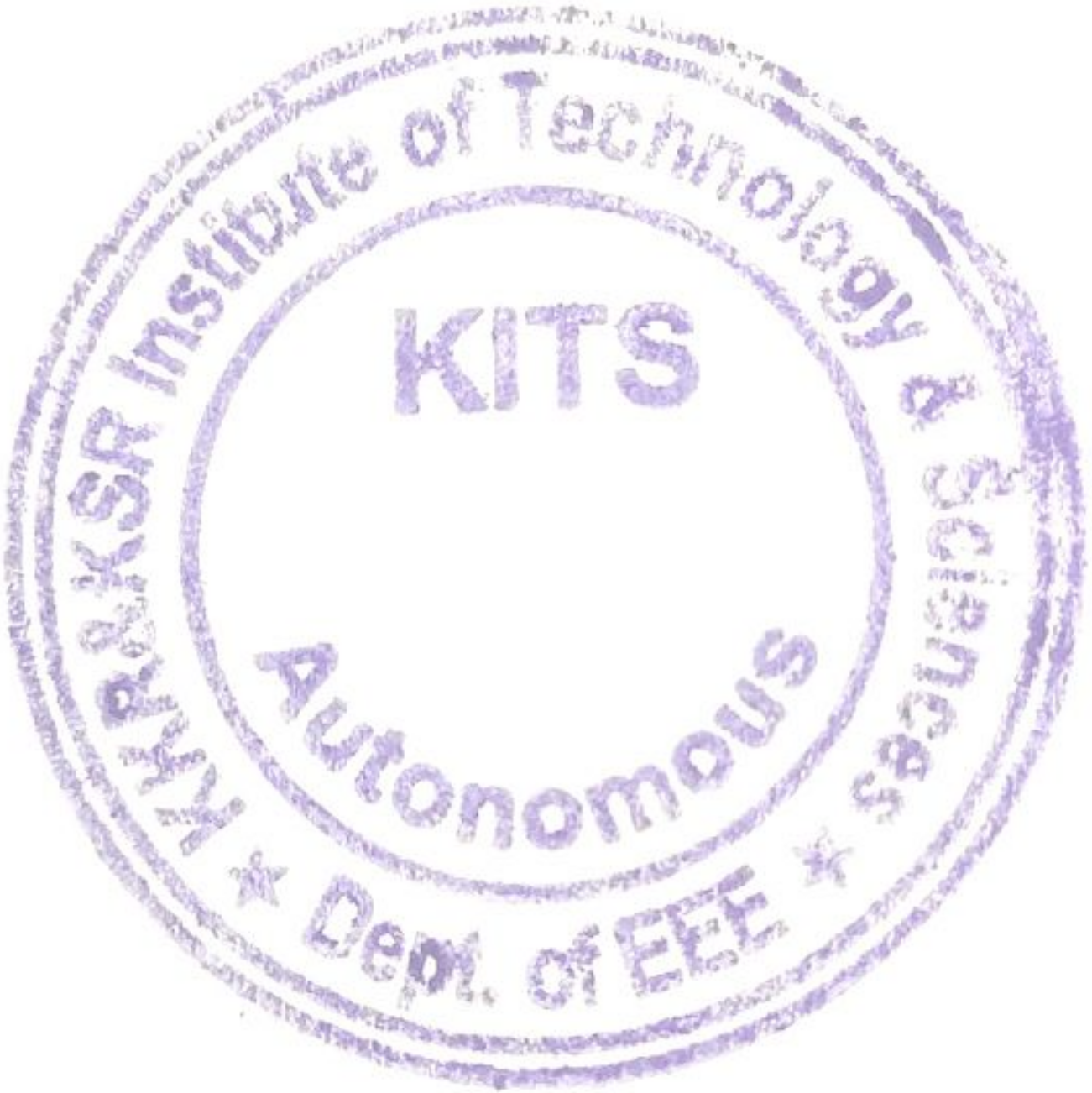
1. Jean-Paul Tremblay Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd edition, Mc Graw Hill Higher Education
2. Seymour Lipschutz, Data Structure with C, TMH
3. ReemaThareja, Data Structures using C, 2nd edition, Oxford

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: IV**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE4S01 | PLC Programming for Automation | 1 | 0 | 2 | 2 |



ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE
**SEMESTER-V (III-I)**

| S. No. | Course Code | Course Title | L | T | P | C | IM | EM | TM |
|---|---|---|---|---|---|---|---|---|---|
| THEORY | | | | | | | | | |
| 1 | 20EE5T01 | Power Generation and Transmission Systems | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | 20EE5T02 | Electrical and Electronics Measurements | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | 20EC5T04 | Signals and Systems | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | | **Professional Elective Course-I** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | | **Open Elective-I** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | 20GE5M04 | Intellectual Property Rights and Patents | 2 | 0 | 0 | --- | --- | --- | --- |
| PRACTICAL | | | | | | | | | |
| 7 | 20EE5L01 | Control System and Simulation Lab | 0 | 0 | 3 | 1.5 | 15 | 35 | 50 |
| 8 | 20EE5L02 | Elect. and Electro. Measurements Lab | 0 | 0 | 3 | 1.5 | 15 | 35 | 50 |
| 9 | 20EE5S01 | JAVA Programing (Advanced level skill Oriented courses I) | 1 | 0 | 2 | 2.0 | --- | 50 | 50 |
| 10 | 20EE5I01 | Summer Internship (During 2 Year) | 0 | 0 | 0 | 1.5 | --- | 50 | 50 |
| | | | | | **Total Credits** | **21.5** | **180** | **520** | **700** |
| **11** | | **Honors/Minor Courses** | **3** | **1** | **0** | **4** | **30** | **70** | **100** |
| **12** | **20EE5A01** | **IoT Applications of Electrical Engineering** | **0** | **0** | **2** | **-** | **-** | **-** | **-** |

**Theory: PCC-3, OEC-1, PEC-1 Practical: PCC-2, SC-1, SI-1, MC-1**

**Honors/Minor Courses-1**

**Additional Laboratory-1**

ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE
**SEMESTER-VI (III-II)**

| S. No. | Course Code | Course Title | L | T | P | C | IM | EM | TM |
|---|---|---|---|---|---|---|---|---|---|
| THEORY | | | | | | | | | |
| 1 | 20EE6T01 | Power System Analysis and Protection | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | 20EE6T02 | Power Electronics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | 20EC6T04 | Microprocessor and Microcontroller | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | | **Professional Elective Course-II** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | | **Open Elective-II** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | 20GE6M02 | Professional Ethics and Human Values | 2 | 0 | 0 | 0 | --- | --- | --- |
| PRACTICAL | | | | | | | | | |
| 7 | 20EE6L01 | Power Systems and Programming Lab | 0 | 0 | 3 | 1.5 | 15 | 35 | 50 |
| 8 | 20EE6L02 | Power Electronics Lab | 0 | 0 | 3 | 1.5 | 15 | 35 | 50 |
| 9 | 20EC6L04 | Microprocessor and Microcontroller Lab | 0 | 0 | 3 | 1.5 | 15 | 35 | 50 |
| 10 | 20SH6S01 | Soft Skill Courses | 1 | 0 | 2 | 2.0 | --- | 50 | 50 |
| | | | **Total Credits** | | | **21.5** | **195** | **505** | **700** |
| **11** | | **Honors/Minor Courses** | **3** | **1** | **0** | **4** | **30** | **70** | **100** |
| **12** | **20EE6P01** | **Engineering Project in Community Services (EPICS)** | **0** | **0** | **2*** | **---** | **---** | **---** | **---** |

**Theory: PCC-3, OEC-1, PEC-1, Practical: PCC-3, SC-1, MC-1**

**Honors/Minor Courses-1**

***EPICS (Apart from regular timetable)**

ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE
**SEMESTER-VII (IV-I)**

| S. No. | Course Code | Course Title | L | T | P | C | IM | EM | TM |
|---|---|---|---|---|---|---|---|---|---|
| THEORY | | | | | | | | | |
| 1 | | **Professional Elective Course-III** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | | **Professional Elective Course-IV** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | | **Professional Elective Course-V** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | | **Open Elective-III** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | | **Open Elective-IV** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | | **Humanities and Social Science Elective** | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| PRACTICAL | | | | | | | | | |
| 7 | 20EE7S01 | Python and its applications (Advanced skill Oriented courses-II) | 1 | 0 | 2 | 2.0 | --- | 50 | 50 |
| 8 | 20EE7I01 | Summer Internship (During 3 Year) | 0 | 0 | 0 | 3 | --- | 50 | 50 |
| | | | | | **Total Credits** | **23** | **180** | **520** | **700** |
| **9** | | **Honors/Minor Courses** | **3** | **1** | **0** | **4** | **30** | **70** | **100** |

**Theory: OEC-2, PEC-3, HSMEC-1 Practical: SC-1, SI-1,**

**Honors/Minor Courses-1**

**SEMESTER-VIII (IV-II)**

| S. No. | Course Code | Course Title | L | T | P | C | IM | EM | TM |
|---|---|---|---|---|---|---|---|---|---|
| THEORY | | | | | | | | | |
| 1 | 20EE8P01 | Project Work/ Internship in Industry | 0 | 0 | 0 | 12 | 60 | 140 | 200 |
| | | | | | **Total Credits** | **12** | **60** | **140** | **200** |
| 2 | | **Honors/Minor Courses (**MOOCS-I) | - | - | - | 2 | - | - | - |
| 3 | | **Honors/Minor Courses** (MOOCS-II) | - | - | - | 2 | - | - | - |

**Practical: PROJ-1,**

**Honors/Minor Courses-2**

**MOOCS-I & II***

(*– Equivalent grades will be given by BOS)

ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE

**LIST OF PROFESSIONAL ELECTIVE COURSES**

Track 1: Electrical Power System

Track 2: Power Electronics & Drives

Track 3: Control and Instrumentation

Track 4: Electronics and Communication Engineering

Track 5: Computer Science and Engineering

| | | |
|---|---|---|
| **Elective-I (Semester V) (III-I)** | | |
| Track 1 | 20EE5E01 | Industrial Electrical Systems and Energy Utilization |
| Track 2 | 20EE5E02 | Special Electrical Machines |
| Track 3 | 20EE5E03 | Advanced Control System |
| Track 4 | 20EC5E05 | Analog and Digital Communication |
| Track 5 | 20IT5E05 | Operating System |
| **Elective-II (Semester VI) (III-II)** | | |
| Track 1 | 20EE6E01 | Power System Operation and Control |
| Track 2 | 20EE6E02 | Line Commutated and Active Rectifiers |
| Track 3 | 20EE6E03 | Instrumentation Engineering |
| Track 4 | 20EC6E05 | Digital Signal Processing and Applications |
| Track 5 | 20IT6E06 | Database Management System |
| **Elective-III (Semester VII) (IV-I)** | | |
| Track 1 | 20EE7E01 | Electrical Distribution System |
| Track 2 | 20EE7E02 | DC Drives |
| Track 3 | 20EE7E03 | Bio-Medical Engineering |
| Track 4 | 20EC7E05 | VLSI System |
| Track 5 | 20CS7E06 | Computer Networks |
| **Elective-IV (Semester VII) (IV-I)** | | |
| Track 1 | 20EE7E04 | Solar and Wind Energy Systems |
| Track 2 | 20EE7E05 | AC Drives |
| Track 3 | 20EE7E06 | Digital Control System |
| Track 4 | 20EC7E06 | Embedded Systems and Applications |
| Track 5 | 20IT7E06 | Principles of Software Engineering |
| **Elective-V (Semester VII) (IV-I)** | | |
| Track 1 | 20EE7E07 | FACTS: Flexible Alternating Current Transmission Systems |
| Track 2 | 20EE7E08 | Electrical and Hybrid Vehicles |
| Track 3 | 20EE7E09 | Industrial Automation |
| Track 4 | 20EC7E07 | Digital Image and Video Processing |
| Track 5 | 20IT7E07 | Big-Data |

ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE

**LIST OF OPEN ELECTIVE COURSES**

| S. No. | Course Code | Course Title | Offering Dept. |
|---|---|---|---|
| 1 | 20CEXO01 | Elements of Civil Engineering | CE |
| 2 | 20CEXO02 | Disaster Management | |
| 3 | 20CEXO03 | Intelligent Transport Systems | |
| 4 | 20CEXO04 | Remote sensing & Geographical Information systems | |
| 5 | 20EEXO01 | Electrical Safety Management | EEE |
| 6 | 20EEXO02 | Non-conventional Energy sources | |
| 7 | 20EEXO03 | Electrical and Hybrid Vehicle | |
| 8 | 20EEXO04 | Electrical Energy Conservation and Auditing | |
| 9 | 20EEXO05 | Industrial Robotics | |
| 10 | 20MEXO01 | Optimization Techniques | ME |
| 11 | 20MEXO02 | Robotics | |
| 12 | 20MEXO03 | Industrial Management Sciences | |
| 13 | 20MEXO04 | Automation in Manufacturing | |
| 14 | 20ECXO01 | Principles of Communication | ECE |
| 15 | 20ECXO02 | Digital image Processing | |
| 16 | 20ECXO03 | Bio Medical Engineering | |
| 17 | 20ECXO04 | Design of IOT System (IOT) | |
| 18 | 20ECXO05 | MEMS | |
| 19 | 20ECXO06 | Mechatronics | |
| 20 | 20CSXO01 | Computer Graphics | CSE |
| 21 | 20CSXO02 | Cloud Computing | |
| 22 | 20CSXO03 | Computer Networks | |
| 23 | 20CSXO04 | Cryptography and Network Security | |
| 24 | 20ITXO01 | Data Base Management systems (DBMS) | IT |
| 25 | 20ITXO02 | Java Programming | |
| 26 | 20ITXO03 | Principle of software Engineering (PSE) | |
| 27 | 20ITXO04 | Introduction to Machine Learning | |
| 28 | 20CIXO01 | Python Programming | CAI |
| 29 | 20CIXO02 | Fundamentals of Artificial Intelligence | |
| 30 | 20CIXO03 | Human Computer Interaction | |
| 31 | 20CIXO04 | Applications of AI | |
| 32 | 20CDXO01 | Object Oriented Programming (C++) | CSD |
| 33 | 20CDXO02 | Data Structures | |
| 34 | 20CDXO03 | Data warehouse and Mining | |
| 35 | 20CDXO04 | Big Data Analysis | |

**HUMANITIES AND SOCIAL SCIENCE ELECTIVE**

| **S. No.** | Course Code | **Course Title** |
|---|---|---|
| 1 | 20SH7E01 | Entrepreneurship Development |
| 2 | 20SH7E02 | Business Environment |
| 3 | 20SH7E03 | Digital Marking |
| 4 | 20SH7E04 | Human Resource development and OB |

ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE

**LIST OF HONORS COURSES**

| **Year/Sem: II-II (Pool-1)** | | |
|---|---|---|
| S. No | Course Code | Course Name |
| 1 | 20EE4H01 | Design of Electrical Apparatus-I |
| 2 | 20EE4H02 | Advanced Circuits |
| 3 | 20EE4H03 | Electromagnetic waves and transmission lines |
| 4 | 20EE4H04 | Electrical Installation and Estimation |
| **Year/Sem: III-I (Pool-2)** | | |
| 1 | 20EE5H01 | Design of Electrical Apparatus-II |
| 2 | 20EE5H02 | Power Plant Engineering |
| 3 | 20EE5H03 | Digital Logic Design (DLD) |
| 4 | 20EE5H04 | Advanced Measurements |
| **Year/Sem: III-II (Pool-3)** | | |
| 1 | 20EE6H01 | Principles of machine modeling and analysis |
| 2 | 20EE6H02 | Computer Methods in Power system (CMPS) |
| 3 | 20EE6H03 | Neural Networks and Fuzzy Logic |
| 4 | 20EE6H04 | Advanced power system protection |
| **Year/Sem: IV-I (Pool-4)** | | |
| 1 | 20EE7H01 | High voltage AC & DC Transmission |
| 2 | 20EE7H02 | Integrated Renewable Systems |
| 3 | 20EE7H03 | Power Systems dynamics and control |
| 4 | 20EE7H04 | Electric power quality |

ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE

**LIST OF MINORS COURSE (GENERAL)**

| S. No | Course Code | Course Name |
|---|---|---|
| 1 | 20EE4M01 | Electrical Circuit Analysis |
| 2 | 20EE5M01 | Electrical Measurements |
| 3 | 20EE6M01 | Basic Power System Engineering |
| 4 | 20EE7M01 | Basics of Power Electronics |
| 5 | 20EE7M02 | Utilization of Electrical Energy |

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**
**COURSE STRUCTURE AND SYLLABUS**

**Semester: V**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE5T01 | Power Generation and Transmission Systems | 3 | 0 | 0 | 3 |

## COURSE OUTCOMES:

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

CO1 : Describe the different types of conventional power generating methods.
CO2 : Analyze the economic aspects of power generation and different tariff methods
CO3 : Analyze the transmission line parameters
CO4 : Compute performance of transmission lines and describe the various factors affecting the performance of transmission lines.
CO5 : Estimate the sag and tension computation of transmission lines and analyse the different types of cables

## SYLLABUS

**UNIT-I : Conventional Power Generation**

**Thermal power stations:** Selection of site, general layout of a thermal power plant - Types of boilers, economizers, super heaters, condensers, electrostatic precipitators-Merits and demerits.

**Hydroelectric plants:** Selection of site, layout of Hydro stations- types of hydro stations-Merits and demerits.

**Gas Power Plants:** Introduction -Simple layout, combined cycle, Merits and demerits.

**Nuclear Power Plants:** Introduction- layout – Merits and demerits

**UNIT-II : Economic Aspects of Power Generation and Tariff**

**Economic Aspects** –load curve, load duration curve and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, base and peak load plants.

**Tariff Methods**– costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two-part, three–part, and power factor tariff methods

**UNIT-III : Transmission Line Parameters**

Conductor materials - Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase– Single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors – Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and three phase–Single and double circuit lines- Bundled conductors.

**UNIT-IV : Performance Analysis of Transmission Lines and Various Factors governing**

Short and medium Transmission Lines- Model representations–Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks- Mathematical Solutions to estimate regulation and efficiency Long Transmission Lines- Rigorous Solution for long line equations – Surge Impedance and SIL of Long Lines (Qualitative).

Skin and Proximity effects – Description and effect on Resistance of Solid Conductors –Ferranti effect – Charging Current – Corona – Description of the phenomenon–Factors affecting corona–Critical voltages and power loss – Radio Interference.

**UNIT-V : Mechanical Design of Transmission line and Underground Cables**

Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor – Stringing chart and sag template and its applications–Types of Insulators – String efficiency and Methods for improvement - Voltage distribution–Calculation of string efficiency – Capacitance grading and Static Shielding.

**Underground Cables** - Types of cables, calculation of insulation resistance, Grading of cables – capacitance grading and inter-sheath grading-(Qualitative).

**TEXTBOOKS:**

1. Wadhwa C. L, Electrical power systems"6th Edition, New Age International (P) Limited Publishers, 2018.
2. John J Grainger, William D Stevenson, Power system Analysis,4th Ed, TMC Companies.
3. Soni Gupta M. L, Bhatnagar P. V, Chakrabarthy U. S, A Text Book on Power System Engineering, 2nd Ed, Dhanpat Rai& Co Pvt. Ltd.
4. Nagarath I. J and Kothari D. P, Modern Power System Analysis, 2nd Ed, Tata McGraw Hill.

**REFERENCE BOOKS**:

1. Deshpande M V, Elements of Electrical Power Station Design"1st Ed, PHI, New Delhi. 2009.
2. Murthy P. S. R, Electrical Power Systems, 1st Ed, B. S. Publications, 2017.
3. Mehta V. K, Principles of Power System, 4th Ed, S. Chand Publications, 2008.
4. Gupta B. R, Power System Analysis and Design, 3rd Ed, A H Wheeler Publishing Company Limited, 1998.

**WEBLINKS:**

https://www.tutorialspoint.com/electrical-power-system-components

https://onlinecourses.nptel.ac.in/noc20_ee39/preview

**Semester: V**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE5T02 | Electrical and Electronic Measurements | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Illustrate the working of different types of instruments for measurement of voltage and current.

CO2 : Identify the working of different types of instruments for measurement of power and power factor.

CO3 : Design various types of bridges.

CO4 : Understand construction, working principle and types of oscilloscopes.

CO5 : Analyze various types of signal analyzers, their construction and operation.

**SYLLABUS**

**UNIT-I : Measurement of Electrical Quantities**

Classification – deflecting, control and damping torques, – PMMC, moving iron type Construction, Torque equation, Range extension, Errors and compensations, advantages and disadvantages. CT and PT-construction, theory, errors-Numerical Problems

**UNIT-II : Measurement of Power and Power Factor**

Electrodynamometer type wattmeter (LPF and UPF), Power factor meters: Dynamometer and M.I type (Single phase and three phase), construction, theory, torque equation, advantages and disadvantages - Numerical Problems.

**UNIT-III : Measurements of Parameters**

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

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

**UNIT-IV : Oscilloscopes**

Cathode ray oscilloscope – Time base generator – Horizontal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns –Special purpose CROs; sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope.

**UNIT-V : Signal Analyzers**

Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays.

**TEXTBOOKS:**

1. Golding. E. W and Widdis F. C, Electrical Measurements and measuring Instruments, 5th ed., wheeler Publishing, 2011
2. Helfrick A. D and Cooper W. D, Modern Electronic Instrumentation and Measurement Techniques, 5th ed., PHI, 2002.
3. Sawhney A. K, A course in Electrical and Electronic Measurements and Instrumentation, 4th ed., Dhanpatrai & Co., 2014

**REFERENCE BOOKS:**

1. Rajput R. K, Electrical and Electronic Measurements and instrumentation, 5th ed., S. Chand., 2009
2. Buckingham and Price, Electrical Measurements, Prentice – Hall, 1970
3. Forest K. Harris. John Wiley and Sons, Electrical Measurements, 3rd ed., Wiley, 2007
4. Reissland, M. U, Electrical Measurements: Fundamentals, Concepts, Applications, 4th ed., New Age International (P) Limited, 2009
5. Banerjee G. K, Electrical and Electronic Measurements, PHI Learning Private Ltd, New Delhi–2012.

**WEBLINKS:**

https://www.tutorialspoint.com/electronic_measuring_instruments/index.htm
https://onlinecourses.nptel.ac.in/noc19_ee44/preview

**Semester: V**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC5T04 | Analysis of Signals and Systems | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

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

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

CO3 : understand analysis of Linear systems.

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

CO5 : 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.

**TEXTBOOKS:**

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 ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| Semester: V | | | | | |
|---|---|---|---|---|---|
| **Course Code** | Course Name | **L** | **T** | **P** | **C** |
| | **Industrial Electrical Systems and Energy Utilization** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Design the electrical wiring systems for residential, commercial and industrial Systems. |
| CO2 | : | Analyze and select the proper size of various electrical system components |
| CO3 | : | Study the basic principles of illumination and its measurements and to design the different types lighting systems |
| CO4 | : | Acquaint with the different types of heating and welding techniques |
| CO5 | : | Describe the basic principles of electric traction including speed–time curves of different traction services and calculation of braking, acceleration and other related parameters. |

**SYLLABUS**

| **UNIT-I** | **:** | **Industrial Electrical Systems I** |
|---|---|---|
| HT connect ion, industrial substation, Transformer select ion, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components | | |
| **UNIT-II** | **:** | **Industrial Electrical Systems II** |
| DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks. | | |
| **UNIT-III** | **:** | **Illumination Systems** |
| Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting | | |

| | | |
|---|---|---|
| scheme for a residential and commercial premise, flood lighting. | | |
| **UNIT-IV** | **:** | **Electric Heating & Electric Welding** |
| **Electric Heating:** Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.<br>**Electric Welding:** Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding | | |
| **UNIT-V** | **:** | **Electric Traction** |
| System of electric traction and track electrification– Review of existing electric traction systems in India–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves. Calculations of tractive effort– power –Specific energy consumption for given run, Effect of varying acceleration and braking retardation–Adhesive weight and braking retardation adhesive weight and coefficient of adhesion, | | |

**TEXT BOOKS:**

1. UppalS.L and Garg G. C, Electrical Wiring, Estimating & costing, Khanna publishers, 2008.
2. RainaK.B, Electrical Design, Estimating & Costing, New age International, 2007.

**REFERENCE BOOKS**:

1. 1.Singh.S and Singh R.D, Electrical estimating and costing, Dhanpat Rai and Co., 1997.
2. Joshi H, Residential Commercial and Industrial Systems, McGraw Hill Education, 2008.

**WEB LINKS:**

**1.https://dokumen.tips/download/link/free-download-here-wiring-estimating-and-costing-by-uppalpdf-free-download-here**

**2. https://electricalk4u.blogspot.com/2018/06/electrical-desing-estimating-and.html**

**Semester: V**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE5E02 | Special Electrical Machines | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Analysis between brush dc motor and brush less dc motor.

CO2 : Describe the performance and control of stepper motors, and their applications.

CO3 : Analysis theory of operation and control of switched reluctance motor.

CO4 : Analyze the theory of travelling magnetic field and applications of linear motors

CO5 : Able to describe the significance of electrical motors for traction drives.

**SYLLABUS**

**UNIT-I : Permanent magnet materials and PMDC motors**

Introduction-classification of permanent magnet materials used in electrical machines-minor hysteresis loop and recoil line-Stator frames of conventional dc machines-Development of electronically commutated dc motor from conventional dc motor-Permanent-magnet materials and characteristics-B-H loop and demagnetization characteristics-high temperature effects reversible losses-Irreversible losses-Mechanical properties, handling and magnetization Application of permanent magnets in motors-power density-operating temperature range-severity of operation duty.

**UNIT-II : Stepper Motors**

Principle of operation of Stepper Motor – Constructional details - Classification of stepper motors – Different configuration for switching the phase windings - Control circuits for stepper motors – Open loop and closed loop control of two-phase hybrid stepping motor.

**UNIT-III : Switched Reluctance Motors**

Construction and Principle of operation of Switched Reluctance Motor – Comparison of conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

**UNIT-IV : Permanent Magnet Brushless DC Motor**

Principle of operation of BLDC motor - Types of constructions - Surface mounted and interior type permanent magnet DC Motors - Torque and EMF equations for square wave & Sine wave for PMBLDC Motor – Torque - Speed characteristics of square wave & Sine wave for PMBLDC Motor - Merits & demerits of square wave & Sine wave for PMBLDC Motor - Performance and efficiency – Applications

**UNIT-V : Linear Induction Motors (LIM)**

Construction– principle of operation–Double sided LIM from rotating type Induction Motor – Schematic of LIM drive for traction – Development of one-sided LIM with back iron- equivalent circuit of LIM.

**TEXTBOOKS:**

1. Miller. T. J. E, Brushless Permanent magnet and reluctance motor drives, 3rd ed., Clarendon press, 1993, Oxford.
2. Venkata Ratnam. K, Special electrical Machines, 2nd ed., University press, 2021, New Delhi.

**WEB LINKS:**

https://www.tutorialspoint.com/theory_of_machines/index.asp
https://www.javatpoint.com/electrical-machines-tutorial
https://onlinecourses.nptel.ac.in/noc22_ee06/preview

**KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCES**

**(Autonomous)**

Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh 522017

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: V |
| Course Code | Course Name | L | T | P | C |
| | **Advanced Control Systems** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Formulate different state models in canonical forms. |
| CO2 | : | Design of state feedback control using the pole placement technique and state observer design for a given control system. |
| CO3 | : | Analyse of nonlinear system using the describing function technique and determine the stability of a linear autonomous system using lypnov method. |
| CO4 | : | Determine minimization of functionals using calculus of variation studied. |
| CO5 | : | Formulate and solve the LQR problem and riccatti equation. |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **State space analysis** |
| State Space Representation in Canonical forms – Controllable canonical form – Observable canonical form – Diagonal Canonical Form - Jordan Canonical Form - Principle of duality – Controllability and observability test from Jordan canonical form and other canonical forms. | | |
| **UNIT-II** | **:** | **Design of state feedback controllers and state Observers** |
| Design of state feedback control through pole placement and Ackerman's formula – Design of state observers (Full order & reduced order). | | |
| **UNIT-III** | **:** | **Describing function analysis&Stability analysis** |
| Introduction to nonlinear systems, Types of nonlinearities, describing functions, stability using describing functions.<br>Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems. | | |
| **UNIT-IV** | **:** | **Calculus of variations** |
| Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality | | |

| | | |
|---|---|---|
| constraints – Euler lagrangine equation. | | |
| **UNIT-V** | **:** | **Optimal control** |
| Linear Quadratic Optimal Regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by Continuous Time Algebraic Riccatti equation (CARE) - Optimal controller design using LQG framework. | | |

**TEXT BOOKS:**

1. Ogata.K, Modern Control Engineering, Prentice Hall of India, 3rd ed., 1998
2. Kuo B.C, Automatic Control Systems, Prentice Hall Publication

**REFERENCE BOOKS**:

1. Gopal.M, Modern Control System Theory, New Age International Publishers, 2nded.,1996
2. Nagarath I.J and Gopal.M, Control Systems Engineering, New Age International (P) Ltd.
3. Gopal.M, Digital Control and State Variable Methods, Tata McGraw–Hill Companies,1997.
4. Stainslaw H. Zak, Systems and Control, Oxford Press, 2003.
5. Donald E.Kirk, Optimal control theory: an Introduction, Dover publications

WEB LINKS:

1. http://docs.znu.ac.ir/members/pirmohamadi_ali/Control/Katsuhiko%20Ogata%20_%20Modern%20Control%20Engineering%205th%20Edition.pdf
2. https://controltheorymaster.files.wordpress.com/2017/11/farid-golnaraghi-benjamin-c-kuo-automatic-control-systems.pdf
3. https://www.scribd.com/document/208831982/Control-Systems-M-Gopal

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| | **Analog and Digital Communication** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Analyze and design of various continuous wave and angle modulation and demodulation techniques |
| CO2 | : | Understand the effect of noise present in continuous wave and angle modulation techniques |
| CO3 | : | Attain the knowledge about AM , FM Transmitters and Receivers |
| CO4 | : | Design and Analyze the various Pulse Modulation Techniques. |
| CO5 | : | Understand the concepts of Digital Modulation Techniques and Baseband transmission**.** |

**SYLLABUS**

| **UNIT-I** | **:** | **Amplitude Modulation** |
|---|---|---|

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves -Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.

| **UNIT-II** | **:** | **Angle Modulation** |
|---|---|---|

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave -Generation of FM Signal-Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

| **UNIT-III** | **:** | **Transmitters and Receivers** |
|---|---|---|

**Transmitters:** Classification of Transmitters, AM Transmitters, FM Transmitters

**Receivers:** Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| | | |
|---|---|---|
| **UNIT-IV** | **:** | **Pulse Modulation and Pulse Code Modulation** |

**Pulse Modulation:** Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.

**Pulse Code Modulation:** PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

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| **UNIT-V** | **:** | **Digital Modulation Techniques** |

**Digital Modulation Techniques:** ASK- Modulator, Coherent ASK Detector, FSK- Modulator, NonCoherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.

**Baseband Transmission and Optimal Reception of Digital Signal:** A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

**TEXT BOOKS:**

1. Simon Haykin, John Wiley - Analog and Digital Communications, 2005.
2. Wayne Tomasi - Electronics Communication Systems-Fundamentals through Advanced, 5th Ed., PHI, 2009.

**REFERENCE BOOKS**:

1. Herbert Taub, Donald L Schilling, Goutam Saha- Principles of Communication Systems, 3rd Ed., McGraw Hill, 2008.
2. Dennis Roddy and John Coolean - Electronic Communications, 4th Ed., PEA, 2004.
3. George Kennedy and Bernard Davis- Electronics & Communication System, TMH 2004
4. K. Sam Shanmugam, Willey- Analog and Digital Communication, 2005.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| Programme: EEE | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| | **OPERATING SYSTEMS** | 3 | 0 | 0 | 3 |
| Subject Category:PEC | | | | | |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Study the basic concepts and functions of operating systems. |
| CO2 | : | Understand the structure and functions of OS. |
| CO3 | : | Learn about Processes, Threads and Scheduling algorithms. |
| CO4 | : | Understand the principles of concurrency and Dead locks. |
| CO5 | : | Learn various memory management schemes |

**SYLLABUS**

| **UNIT-I** | **:** | **Introduction to Operating System and Concept Process Management** |
|---|---|---|
| Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types. Process concept, The process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms. | | |
| **UNIT-II** | **:** | **Memory Management** |
| Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation **Virtual Memory Management:** Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing | | |
| **UNIT-III** | **:** | **Concurrency& Principles of Deadlock** |
| Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock. | | |
| **UNIT-IV** | **:** | **File system Interface** |

| | | |
|---|---|---|
| The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.<br>**File System implementation:** File system structure, allocation methods, free-space management<br>**Mass-storage structure:** overview of Mass-storage structure, Disk scheduling, Device drivers | | |
| **UNIT-V** | **:** | **Linux System & Android Software Platform** |
| Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call. Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management | | |

**Text Books:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012.
2. William Stallings, Operating Systems – Internals and Design Principles, 7th Edition, Prentice Hall, 2011.
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.

**References Books:**

1. Andrew S. Tanenbaum, Modern Operating Systems, 2nd Ed, Addison Wesley, 2001.
2. Charles Crowley, Operating Systems: A Design-Oriented Approach, Tata McGraw Hill Education, 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, 2nd Ed, Tata McGraw – Hill Education, 2007.

**KKR & KSR INSTITUTE OF TECHNOLOGY AND SCIENCES**

**(Autonomous)**

Vinjanampadu, Vatticherukuru Mandal, Guntur, Andhra Pradesh 522017

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: V |
| Course Code | Course Name | L | T | P | C |
| | **INTELLECTUAL PROPERTY RIGHTS AND PATENTS (IPR& P)** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Identify different types of intellectual property rights may be prescribed by an output with supporting agencies internationally. |
| CO2 | : | Explain the ways to protect literary and artistic works of the authors |
| CO3 | : | Illustrate the process of registering innovative products i.e., Patents |
| CO4 | : | Analyze the ways to maintain of Trade Marks |
| CO5 | : | Suggest the ways to protect trade secrets in the organizations Explain different laws available related to cybercrimes |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Introduction to Intellectual property:** |
| Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights | | |
| **UNIT-II** | **:** | **Law of Copyrights:** |
| Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. | | |
| **UNIT-III** | **:** | **Law of Patents:** |
| Foundation of patent law, patent searching process, ownership rights and transfer. Patent litigation. Dilution of patent rights, patent registration. | | |
| **UNIT-IV** | **:** | **Trade Marks**: |
| Purpose and function of trademarks, acquisition of trade mark rights, protectable matter (strength and categories of trade marks), selecting, and evaluating trade mark, trade mark registration processes. | | |

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| UNIT-V | : | Trade Secrets and Cyber law |
|---|---|---|
| Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes litigation. Introduction to Cyber Law – Information Technology Act 2000 & Cyber Crimes & its types.<br><br>**Real time examples must be added to the concepts requires.** | | |

**TEXT BOOKS:**

1. Intellectual property right, Deborah, E. Bouchoux, Cengage learning.

2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc- Graw Hill Publishing Company Ltd.

**REFERENCE BOOKS**:

3. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).

4. Cyber Law - Texts & Cases, South-Western’s Special Topics Collections.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: V |
| Course Code | Course Name | L | T | P | C |
| | **Control system and simulation Lab** | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

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

CO1 : Analyze the Characteristics of Synchro's

CO2 : Study the Characteristics of DC & AC Servo motor & Transfer function of DC motor & generator

CO3 : Analyze the time response of second order system

CO4 : Analyze the Lead & lag compensators

CO5 : Model the Field & Armature controlled Dc servo motor,P,PI,PD,PID controllers, 2$^{nd}$ order system using MATLAB software- simulink

**LIST OF EXPERIMENTS**

1. Obtain the Characteristics of Synchro's.
2. Obtain the Characteristics of DC Servo motor.
3. Interpret the Transfer function of DC motor.
4. Interpret the Transfer function of DC generator.
5. Obtain the Characteristics of AC servo motor.
6. Analyse the Time response of Second Order System.
7. Estimate the Magnitude and phase plot of Lag and lead compensator.
8. Analyse the Block Diagram Representation of Field Controlled DC servo Motor Using Simulink.
9. Analyse the Block Diagram Representation of Armature Controlled DC servo Motor Using Simulink.
10. Analyse the Digital simulation of conventional (P, PI, PD, PID) and intelligent (fuzzy) controllers using MATLAB software.
11. Analyse the Stability analysis of a second order system using MATLAB software.

**Note: Any ten experiments to be conducted**

REFERENCE(S)

1. Department Laboratory Manual.

## COURSE STRUCTURE AND SYLLABUS

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: V |
| Course Code | Course Name | L | T | P | C |
| | **Electrical & Electronics Measurements Lab** | 0 | 0 | 3 | 1.5 |

**COURSE OUTCOMES:**

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

CO1 : Calibration of Voltmeter, Ammeter & Energy meter

CO2 : Measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance

CO3 : Analyze the characteristics of LVDT & Measure the strains, frequency and phase difference.

CO4 : Measure the Choke coil parameters

CO5 : Measure the Active & Reactive power

**LIST OF EXPERIMENTS**

1. Crompton D.C. Potentiometer - Calibration of PMMC ammeter and PMMC voltmeter.
2. Calibration of dynamometer wattmeter using phantom loading.
3. Calibration of LPF Wattmeter – by direct loading.
4. Measurement of Power and Power Factor in a three phase AC circuit by two-wattmeter method.
5. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
6. Measurement of Power by 3 Voltmeter & 3 Ammeter method.
7. Measurement of three phase Reactive power with single wattmeter for balanced loading.
8. Kelvin's double Bridge - Measurement of resistance - Determination of tolerance.
9. Capacitance Measurement using Schering Bridge.
10. Inductance Measurement using Anderson Bridge.
11. Measurement of phase difference, frequency using Lissajous patterns in CRO.
12. Calibration & Testing of Single-phase Energy meter.
13. Calibration of AC Voltmeter and Measurement of choke coil parameters using AC potentiometer in Polar form.
14. Measurement of R, L, and C using Q-meter.
15. LVDT – characteristics.
16. Measurement of strain using strain gauge.

**Note: Any ten experiments to be conducted**

REFERENCE(S)

1. Department Laboratory Manual.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: VI |
| Course Code | Course Name | L | T | P | C |
| 20EE6T01 | **Power System Analysis And Protection** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Study the Circuit Topology, Per Unit System and Power Flows Studies

CO2 : Analysis theory of symmetrical fault analysis

CO3 : Expressing power system stability analysis

CO4 : Compare the different types of circuit Breakers and electromagnetic relays.

CO5 : Extend the Various Schemes of Protection

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Circuit Topology, Per Unit System and Power Flows Studies** |

Graph theory definition – Formation of element node incidence and bus incidence matrices– Primitive network representation – Formation of Ybus matrix by singular transformation and direct inspection methods - Per Unit Quantities–Single line diagram.

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

| | | |
|---|---|---|
| **UNIT-II** | **:** | **Symmetrical Fault UnSymmetrical Fault Analysis** |

Reactances of Synchronous Machine – Three Phase Short Circuit Currents - Short circuit MVA calculations for Power Systems. Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances: Synchronous generator– Transmission line and transformers – Sequence networks–Various types of faults LG – LL – LG and LLL on unloaded alternator – unsymmetrical faults on power system for numerical problems only.

| | | |
|---|---|---|
| **UNIT-III** | : | **Power System Stability Analysis** |

Construction and Principle of operation of Switched Reluctance Motor – Comparison of

| | | |
|---|---|---|
| conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM. | | |
| **UNIT-IV** | **:** | **Circuit Breakers and Electro Magnetic Relays:** |
| **Circuit Breakers:** Introduction to circuit breakers, Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching, Classifications of Circuit Breakers. **Electro Magnetic Relays:** Introduction to Electro Magnetic Relays, Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT protection. | | |
| **UNIT-V** | **:** | **Various Schemes of Protection** |
| Principles of over current, differential, directional and distance protection. Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison,Merzprice protection Of Alternator,Buchholz relay Protection Of Transformer, Carrier Current Protection Of BusBar,Methods of neutral grounding **:**Solid–resistance–Reactance. | | |

**TEXT BOOKS:**

1. Ram Badari and Viswakarma D.N, Power System Protection and Switchgear, TMH Publications
2. MadhavaRao T.S., Power system protection- Static Relays with microprocessor applications. TMH

**REFERENCE BOOKS:**

1. Paithankar and Bhide S.R, Fundamentals of Power System Protection, PHI, 2003.
2. Mason C R, Art & Science of Protective Relaying, Wiley Eastern Ltd.
3. Bhavesh Bhalja, Maheshwari R.P., Nilesh G.Chothani, Protection and Switch Gear, Oxford University Press, 2013

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: VI**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE6T02 | Power Electronics | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Study & design of the characteristics of various power semiconductor devices |
| CO2 | : | Expressing the operation of 1-ø full–wave converters and analyze harmonics. |
| CO3 | : | Comparison the operation of different types of DC-DC converters. |
| CO4 | : | Summarizing the operation of inverters and application of PWM techniques. |
| CO5 | : | Analyze the operation of AC-AC regulators |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Characteristics of Power Semi Conductor Devices** |

Basic Theory of Operation - Static Characteristics-Two Transistors analogy -Turn on and Turn off Methods - Methods of SCR Triggering - Dynamic & Gate Characteristics of SCR - Series and Parallel Operation - Snubber circuit - Characteristics of Power MOSFET and IGBT.

| | | |
|---|---|---|
| **UNIT-II** | **:** | **Single Phase AC-DC Converters** |

Single Phase half wave controlled rectifiers - R load and RL load with and without freewheeling diode - Single Phase fully controlled bridge converter with R load, RL load and RLE load - Continuous and Discontinuous conduction - Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction – Expression for output voltages – Single Phase semi Converter with R load, RL load and RLE load – Continuous and Discontinuous conduction - Harmonic Analysis - Single Phase Dual Converters - Numerical Problems

| | | |
|---|---|---|
| **UNIT-III** | **:** | **Three Phase AC-DC Converters & AC – AC Converters** |

Three Phase half wave Rectifier with R and RL load -Three Phase fully controlled rectifier with R and RL load - Three Phase semi converter with R and RL load - Expression for Output Voltage - Harmonic Analysis - Three Phase Dual Converters - Numerical Problems.

Single Phase AC-AC Regulator with R and RL loads – TRIAC - Three phase AC voltage regulator with R load - Numerical Problems – Cycloconverter (Qualitative)

| | | |
|---|---|---|
| **UNIT-IV** | **:** | **DC–DC Converters** |

| | | |
|---|---|---|
| Operation of Basic Chopper - Classification - Control Techniques - Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) - Output voltage equations using volt-sec balance in CCM & DCM – Expressions for output voltage ripple and inductor current ripple- Numerical Problems. | | |
| **UNIT-V** | **:** | **DC–AC Converters** |
| Introduction - Classification - Single Phase half bridge and full bridge inverters with R and RL loads - Unipolar & Bipolar Switching - Quasi-square wave pulse width modulation - Three Phase square wave inverters - 1200 conduction and 1800 conduction modes of operation - PWM inverters - Sinusoidal Pulse Width Modulation - Current Source Inverter (CSI) - Numerical Problems. | | |

**TEXT BOOKS:**

1. Ned Mohan, Tore M Undeland, William P Robbins, John Wiley & Sons, Power Electronics: Converters, Applications,3rd ed., and Design by Wiley, Pvt. Limited, India.
2. Rashid M., H, Power Electronics: Devices, Circuits and Applications, 4thed., by Prentice Hall of India,
3. Umanand L., Power Electronics: Essentials & Applications by, Wiley, Pvt. Limited, India, 2009.

**REFERENCE BOOKS**:

1. Philip Krein.T, Elements of Power Electronics–oxford
2. Bhimbra.P.S, Power Electronics – by Khanna Publishers.
3. Dubey.G. K, Doradla.S. R, Joshi.A and Sinha.R. M. K,Thyristorised Power Controllers – by New Age International (P) Limited Publishers, 1996.
4. Daniel W.Hart, Mc Graw Hill , Power Electronics.

**WEB LINKS:**

http://fuuu.be/polytech/LANGH300/LED/1995_BOOK_Mohan_820p_Power_Electronics_2nd.pdf
https://www.academia.edu/38989807/Power_Electronics_Circuits_Devices_and_Applications_By_Muhammad_H_Rashid
https://www.technicalbookspdf.com/power-electronics-essentials-and-applications-by-l-umanand/

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC6T04 | Microprocessor and Microcontrollers | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Describe the concepts of microprocessors Remember |
| CO2 | : | Describe 8086 programs in assembly language Remember |
| CO3 | : | Illustrate the interfacing of 8086, with memory and peripherals |
| CO4 | : | Analyze different applications using 8051 micro controllers |
| CO5 | : | Explain the architecture of ARM Processors |

**SYLLABUS**

| **UNIT-I** | **:** | **Introduction** |
|---|---|---|
| Basic Microprocessor architecture, Harvard and Von Neumann architectures with examples, Microprocessor Unit versus Microcontroller Unit, CISC and RISC architectures. 8086 Architecture: Main features, Register organization of 8086, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration | | |
| **UNIT-II** | **:** | **8086 Programming** |
| Program development steps, instructions, addressing modes, assembler directives, assembly language program development tools. Programs on Multi byte Arithmetic operations, Display Text, Factorial and sorting. | | |
| **UNIT-III** | **:** | **8086 Interfacing** |
| Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS Peripherals: Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers. | | |
| **UNIT-IV** | **:** | **8051 Microcontroller** |
| Intel 8051 MICROCONTROLLER: Architecture, Hardware concepts, Input/output ports and circuits, external memory, counters/timers, serial data input/output, interrupts.<br>Assembly language programming: Instructions, addressing modes, simple programs. | | |

| | | |
|---|---|---|
| Interfacing to 8051: A/D and D/A Convertors, Stepper motor interface, keyboard, LCD Interfacing, Traffic lights control. | | |
| **UNIT-V** | **:** | **ARM Processor** |
| ARM ARCHITECTURES AND PROCESSORS: ARM Architecture, ARM Processors Families, ARM Cortex-M Series Family, ARM Cortex-M3 Processor Functional Description, functions and interfaces.Programmers Model – Modes of operation and execution, Instruction set summary | | |

**TEXT BOOKS:**

1. Douglas V Hall, SSSP Rao, Microprocessors and Interfacing – Programming and Hardware, 3rd Ed., Tata McGraw Hill Education Private Limited, 1994.
2. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, The 8051 Microcontrollers and Embedded systems Using Assembly and C, 2nd Ed., Pearson, 2011.
3. Joseph You, The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors.

**REFERENCE BOOKS**:

1. Dr. Alexander G. Dean, Embedded Systems Fundamentals with Arm Cortex-M based Microcontrollers: A Practical Approach in English Published, Arm Education Media, 2017.
2. Cortex -M3 Technical Reference Manual

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| Semester: VI | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| 20EE6E01 | **Power System Operation & Control** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Analyze the economic dispatch of Thermal Power Stations. |
| CO2 | : | Solve optimal scheduling of hydro thermal problem |
| CO3 | : | Describe the unit commitment problem. |
| CO4 | : | Discuss Load Frequency control. |
| CO5 | : | Explain reactive power control and line power compensation |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Economic Operation of Power Systems** |
| Optimal operation of Generators in Thermal power stations, – Heat rate curve – Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula. | | |
| **UNIT-II** | **:** | **Hydrothermal Scheduling & Unit Commitment** |
| Optimal scheduling of Hydrothermal System**:** Mathematical Formulation – Solution Technique. Optimal unit commitment problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming. | | |
| **UNIT-III** | **:** | **Load Frequency Control-I** |
| Necessity of keeping frequency constant- **S**peed governing mechanism and modeling – Control area concept LFC control of a single-area system. Static and dynamic analysis of uncontrolled and controlled cases.Proportional plus Integral control of single area and its block diagram representation. | | |
| **UNIT-IV** | **:** | **Load Frequency Control-II** |
| Block diagram development of Load Frequency Control of two area system uncontrolled case and controlled case. Tie-line bias control. Load Frequency Control and Economic dispatchcontrol. | | |
| **UNIT-V** | **:** | **Reactive Control and computer control of power systems** |
| Overview of Reactive Power control – Reactive Power compensation in transmission systems – | | |

Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – compensated transmission lines - computer control of power systems - energy control centre - SCADA and EMS functions

**TEXT BOOKS:**

1. Allen J Wood, Bruce F WollenBerg, Power Generation, Operation and Control, 3rd Edition, Wiley Publication 2014.

2. O.I.Elgerd, Electric Energy systems Theory, Second edition , Tata McGraw–hill Publishing Company Ltd.2016

3. I.J.Nagrath & D.P.Kothari, Modern Power System Analysis, 2nd edition, Tata McGraw Hill Publishing Company Ltd,. 4 th. Edition, 2013

**REFERENCE BOOKS**:

1. J.Duncan Glover and M.S.Sarma, Power System Analysis and Design, 5rd Edition, Thompson, 2012.
2. Grainger and Stevenson, Power System Analysis , Tata McGraw Hill, 2003.
3. Hadi Saadat Hadi Saadat , Power System Analysis , 3rd Edition , TMH Edition,1999.
4. Prabha Kundur, Power System stability & control, , TMH,2011.

WEB LINKS:

1. http://powerunit-ju.com/wp-content/uploads/2018/01/Power-Generation-Operation-Control-Allen-Wood.pdf
2. https://ritwikchowdhury.files.wordpress.com/2017/12/power_system_analysis_john_grainger_1st.pdf
3. https://catedras.facet.unt.edu.ar/sep/wp-content/uploads/sites/20/2020/03/Electric-Energy-Systems-Theory-An-Introduction-Elgerd.pdf

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: VI |
| Course Code | Course Name | L | T | P | C |
| 20EE6E02 | **Line commutated & Active Rectifiers** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Analyze controlled rectifier circuits.

CO2 : categorizing the operation of line-commutated rectifiers – 6pulse configurations.

CO3 : expressing the operation of line-commutated rectifiers– multi-pulse configurations.

CO4 : summarizing the operation of PWM rectifiers– operation in rectification

CO5 : Analyze the operation of PWM rectifiers regeneration modes and lagging, leading and unity power factor mode.

**SYLLABUS**

**UNIT-I : Diode rectifiers with passive filtering**

Half-wave diode rectifier with RL and RC loads; 1-phase full-wave diode rectifier with L, C and LC filter; 3-phase diode rectifier with L, C and LC filter; continuous and discontinuous conduction, input current wave shape, effect of source inductance; commutation overlap.

**UNIT-II : Thyristor rectifiers with passive filtering**

Half-wave thyristor rectifier with RL and RC loads; 1-phase thyristor rectifier with L and LC filter; 3-phase thyristor rectifier with L and LC filter; continuous and discontinuous conduction, input current wave shape.

**UNIT-III : Multi-Pulse converter**

Review of transformer phase shifting, generation of 6-phase ac voltage from 3-phase ac, 6-pulse converter and 12-pulse converters with inductive loads, steady state analysis, commutation overlap, notches during commutation.

**Unit-IV : Single-Phase Ac-Dc Single-Switch and Bidirectional Boost Converter**

Review of dc-dc boost converter, power circuit of single-switch ac-dc converter, steady state analysis, unity power factor operation, closed-loop control structure.

Review of 1-phase inverter and 3-phase inverter, power circuits of 1-phase and 3-phase ac-dc boost converter, steady state analysis, operation at leading, lagging and unity power factors. Rectification and regenerating modes. Phasor diagrams, closed-loop control structure

**UNIT-V : Isolated single-phase ac-dc fly back converter**

Dc-dc fly back converter, output voltage as a function of duty ratio and transformer turns ratio. Power circuit of ac-dc fly back converter, steady state analysis, unity power factor operation, closed loop control structure.

**TEXT BOOKS:**

1. Kassakian J.G. F and Verghese G.C, Principles of Power Electronics, Addison-Wesley, 1991.
2. Umanand.L, Power Electronics: Essentials and Applications, Wiley India,2009.

**REFERENCE BOOKS:**

1. Mohan N., and Undel T.M,, Power Electronics Converters, Applications and Design,JohnWiley & Sons, 2007.
2. Erickson R., Wand Maksimovic .D, Fundamentals of Power Electronics, Springer Science& Business Media, 2001.

**WEB LINKS:**

1. https://www.academia.edu/8180808/Fundamental_of_Power_Electronics
2. https://www.academia.edu/38989807/Power_Electronics_Circuits_Devices_and_Applications_By_Muhammad_H_Rashid

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE STRUCTURE AND SYLLABUS

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: VI |
| Course Code | Course Name | L | T | P | C |
| 20EE6E03 | **Instrumentation Engineering** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Analyze the performance characteristics of each instrument.

CO2 : Describe the working principle, selection criteria and applications of various transducers.

CO3 : Illustrate measurement techniques for strain, acceleration, velocity, force and torque

CO4 : Select appropriate passive or active transducer for measurement of physical quantities.

CO5 : Demonstrate the operation and appearance of various digital voltmeters.

**SYLLABUS**

**UNIT-I : Performance characteristics of instruments**

Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – modulation– Sampled data, and pulse modulation and pulse code modulation.

**UNIT-II : Transducers**

Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – Strain gauge and its principle of operation -Thermistors – Thermocouples – Piezo electric transducers

**UNIT-III : Measurement of Non–Electrical Quantities-I**

Measurement of strain – Guage factor -Gauge Sensitivity – Displacement – Velocity – Angular Velocity –Acceleration – Force – Torque

**UNIT-IV : Measurement of Non–Electrical Quantities-II**

Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level, Radiation Fundamentals, Total radiation pyrometer, Optical Pyrometer.

**UNIT-V : Digital Voltmeters**

Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Microprocessor based ramp type – DVM digital frequency meter – Digital

phase angle meter.

**TEXT BOOKS:**

1. Kalsi H.S, Electronic Instrumentation, 2nd ed., Tata MCGraw–Hill, 2004
2. Sawhney A.K, A course in Electrical and Electronic Measurements and Instrumentation, 4th ed., Dhanpatrai& Co., 2014

**REFERENCE BOOKS:**

1. Alan S. Morris and RezaLangari, Measurement and Instrumentation theory and application, 3rd ed., Academic Press, 2012
2. Doeblin D.O, Measurements Systems, Applications and Design, 4th ed., Tata MCGraw–Hill, 2003
3. Morris A.S, Principles of Measurement and Instrumentation, 3rd ed., Pearson/ Prentice Hall ofIndia, 2001
4. Helfrick A.D, and Cooper W.D, Modern Electronic Instrumentation and Measurement techniques, 5th ed., Pearson/Prentice Hall of India, 2002
5. Murthy D.V.S, Transducers and Instrumentation, 2nd ed., Prentice Hall of India, 2009

WEB LINKS:

1. https://easyengineering.net/kalsi-electronic-instrumentation/
2. https://www.academia.edu/8140873/A_K_Sawhney_A_course_in_Electrical_and_Electronic_Measurements_and_Instrumentation
3. https://pdfcoffee.com/transducers-and-instrumentation-by-d-v-s-murty-pdf-free.html

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC6E05 | Digital Signal Processing and Applications | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Apply the difference equations concept in the analysis of Discrete time systems. |
| CO2 | : | Use the FFT algorithm for solving the DFT of a given signal. |
| CO3 | : | Design a Digital filter (FIR&IIR) from the given specifications. |
| CO4 | : | Use the Multirate Processing concepts in various applications (eg: Design of phase shifters, Interfacing of digital systems) |
| CO5 | : | Apply the signal processing concepts on DSP Processor. |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Introduction** |

Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, Invertability, Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations: Frequency domain representation of discrete time signals and systems, Review of Z-transforms, solution of difference equations using Z-transforms, System function

| | | |
|---|---|---|
| **UNIT-II** | **:** | **Discrete Fourier Series:** |

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

| | | |
|---|---|---|
| **UNIT-III** | **:** | **Design of IIR Digital Filters & Realizations** |

Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

Design of FIR Digital Filters & Realizations: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters, Basic structures of FIR systems.

| | | |
|---|---|---|
| **UNIT-IV** | **:** | **Multirate Digital Signal Processing** |

Introduction, Decimation, Interpolation Sampling rate conversion, Implementation of sampling rate converters.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

| UNIT-V | : | Introduction To DSP Processors |
|---|---|---|

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSP's, Pipelining, Special addressing modes.

Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers.

**TEXT BOOKS:**

1. John G. Proakis, Dimitris G.Manolakis ,Digital Signal Processing, Principles, Algorithms, and Applications, Pearson Education / PHI, 2007.
2. Oppenheim A.V and Schaffer R.W, Discrete Time Signal Processing, PHI.

**REFERENCE BOOKS**:

1. Andreas Antoniou ,Digital Signal Processing, TATA McGraw Hill , 2006.
2. C. Britton Rorabaugh ,DSP Primer , Tata McGraw Hill, 2005.
3. B.Venkataramani, M.Bhaskar ,Digital Signal Processors – Architecture, Programming and Applications,TATA McGraw Hill, 2002.

| Programme: EEE | | | | | Semester: VI |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| | **Data Base Management Systems** | 3 | 0 | 0 | 3 |
| Subject Category: PEC | | | | | |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Describe a relational database and object-oriented database |
| CO2 | : | Create, maintain and manipulate relational database using SQL |
| CO3 | : | Describe ER model and normalization for database design |
| CO4 | : | Examine issues in data storage and query processing and can formulate appropriate solutions. |
| CO5 | : | Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage |

**SYLLABUS**

| **UNIT-I** | **:** | **Introduction: Database System** |
|---|---|---|
| Characteristics (Database Vs File System), Database Users (Actors on Scene, Workers behind the scene), Advantages of Data base systems, Data base applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence. | | |
| **UNIT-II** | **:** | **Relational Model** |
| Introduction to relational model ,concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance BASIC SQL: Table definitions(create, alter), different DML operations(insert, delete, update), basic SQL querying( select and project) using where clause, arithmetic & logical operations, SQL functions: Date, Time, Numeric and String conversion | | |
| **UNIT-III** | **:** | **Entity Relationship Model** |
| Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. ER Diagrams for Bus reservation system. Banking system and Library information system, Aggregation functions. | | |

| | | |
|---|---|---|
| **UNIT-IV** | **:** | **Schema Refinement (Normalization)** |
| Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency (1NF, 2NFand3NF), Boyce-codd normal form (BCNF). | | |
| **UNIT-V** | **:** | **Transaction Concept** |
| Introduction of Transaction Processing, DBMS Buffers, Types of Failures, Transaction states and Operations, System log, Transaction Properties, Schedules and Types of Schedules. File Organizations and Indexing: File Organization and Indexing, Cluster Indexes. | | |

**TEXTBOOKS:**

1) Raghurama Krishnan, Johannes Gehrke, Database Management Systems, 3rd ed, TMH.

2) Silberschatz, Korth, Database System Concepts, 5th ed, TMH.

**REFERENCEBOOKS:**

1) CJ Date, Introduction to Database Systems, 8th ed, PEA.

2) Ramez Elmasri, Shamkant B. Navathe, Database Management System, 6thed, PEA.

3) Corlos Coronel, Steven Morris, Peter Robb, Database Principles Fundamentals of Design Implementation and Management, Cengage Learning.

**Web References/ e-Resources**:

1) https://nptel.ac.in/courses/106/105/106105175
2) https://www.geeksforgeeks.org/introduction-to-nosql

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester:VI**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20GE6M02 | **Professional Ethics and Human Values** | 2 | 0 | 0 | 0 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Define, Civic Values, Ethics, Behavior, Honesty, Co-Operation& Commitment |
| CO2 | : | Discuss Engineering Ethics and Social Experimentation for the benefit of stakeholders |
| CO3 | : | Analyze the responsibilities of Engineers towards Safety & risk, to improve the Safety and minimize the risk |
| CO4 | : | Present the duties & rights of Engineers |
| CO5 | : | Elucidate the role of Engineers in the ever changing the global Marketing |

**SYLLABUS**

| **UNIT-I** | **:** | **Human Values & Principles for Harmony** |
|---|---|---|

Morals, Values and Ethics – Integrity - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment– Self-confidence – Spirituality- Character. Truthfulness – Customs and Traditions - Value Education –Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence.

| **UNIT-II** | **:** | **Engineering Ethics and Social Experimentation** |
|---|---|---|

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

| **UNIT-III** | **:** | **Engineers' Responsibilities towards Safety and Risk** |
|---|---|---|

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/s Involuntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/s Immediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

| | | |
|---|---|---|
| **UNIT-IV** | **:** | **Engineers' Duties and Rights** |
| Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality - Professional and Individual Rights –Confidential and Proprietary Information - Conflict of Interest- Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving- Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing | | |
| **UNIT-V** | **:** | **Global Issues** |
| Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics - Intellectual Property Rights. | | |

**TEXT BOOKS:**

1. Professional Ethics, R. Subramaniam – Oxford Publications, New Delhi.
2. Professional Ethics and Morals, A. R. Aryasri, Dharanikota Suyodhana - MaruthiPublications.

**REFERENCE BOOKS**:

1. Engineering Ethics, Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
2. Engineering Ethics & Human Values, M. Govindarajan, S. Natarajan and V. S. SenthilKumar- PHI Learning Pvt. Ltd – 2009.
3. Professional Ethics and Human Values, A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
4. Professional Ethics and Human Values, D. R. Kiran-Tata McGraw-Hill - 2013

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: VI**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| | **Power Systems & Programming lab** | **0** | **0** | **3** | **3** |

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

CO1 : Determine the sequence impedance of various power system components

CO2 : Determine the ABCD parameters of transmission lines

CO3 : Determination of various parameters using load flow studies & Economic dispatch

CO4 : Evaluate the Transient stability of Power System

CO5 : Apply load frequency control to power system

**LIST OF EXPERIMENTS**

1. Computation of Transmission Line Parameters

2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks

3. Power Flow Analysis using Gauss-Seidel Method.

4. Power Flow Analysis using Newton Raphson Method

5. Symmetric and unsymmetrical fault analysis

6. Transient stability analysis of SMIB System

7. Economic Load dispatch without losses

8. Economic Load dispatch with losses

9. Load frequency dynamics of single area load frequency control with and without PI controller

10. Load frequency dynamics of two area load Frequency control

11. MATLAB Program to Solve Swing Equation using Point-by-Point Method

12. State estimation: Weighted least square estimation

13. Electromagnetic Transients in Power Systems : Transmission Line Energization

**Note: Any ten experiments to be conducted**

REFERENCE(S):

Department Laboratory Manual.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: VI**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE6L02 | Power Electronics Lab | 0 | 0 | 3 | 3 |

**Learning outcomes:**

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

| | | |
|---|---|---|
| CO1 | : | Study & design of the characteristics of various power semiconductor devices |
| CO2 | : | Expressing the operation of 1-ø full–wave converters and analyze harmonics. |
| CO3 | : | Comparison the operation of different types of DC-DC converters. |
| CO4 | : | Summarizing the operation of inverters and application of PWM techniques. |
| CO5 | : | Analyze the operation of AC-AC regulators |

**Any 10 of the Following Experiments are to be conducted**

1. Characteristics of Thyristor, MOSFET & IGBT.
2. R, RC & UJT firing circuits for SCR.
3. Single -Phase semi converter with R & RL loads.
4. Single -Phase full converter with R & RL loads.
5. Three- Phase full converter with R &RL loads.
6. Single Phase dual converter in circulating current & non circulating current mode of operation.
7. Single -Phase AC Voltage Regulator with R & RL Loads.
8. Single Phase step down Cyclo converter with R & RL Loads.
9. Boost converter in Continuous Conduction Mode operation.
10. Buck converter in Continuous Conduction Mode operation.
11. Single -Phase square wave bridge inverter with R & RL Loads.
12. Single - Phase PWM inverter.

**REFERENCE(S)**

1. Department Laboratory Manual.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester: VI**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC6L04 | MICROPROCESSOR & MICROCONTROLLERS LAB | 0 | 0 | 3 | 1.5 |

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

CO1 : To perform the Assembly language directives on 8086 microprocessor and interfacing

CO2 : To perform assembly language program on 8051 microcontrollers

**LIST OF EXPERIMENTS**

**PART- A: (Minimum of 4 Experiments has to be performed)**

**8086 Assembly Language Programming using Assembler Directives**

1. Sorting of an array
2. Multibyte addition/subtraction
3. Addition of n-BCD numbers
4. Factorial of given n-numbers
5. Multiplication and Division operations

**PART- B: (Minimum of 3 Experiments has to be performed)**
**8086 Interfacing**

1. Hardware/Software Interrupt Application
2. A/D Interface through Intel 8255
3. D/A Interface through Intel 8255
4. Keyboard and Display Interface through Intel 8279
5. Generation of waveforms using Intel 8253/8254

**PART- C: (Minimum of 4 Experiments has to be performed)**
**8051 Assembly Language Programs**

1. Finding number of 1's and number of 0's in a given 8-bit number
2. Addition of even numbers from a given array
3. Average of n-numbers
4. Switches and LEDs
5. 7-Segment display (multiplexed)
6. Stepper Motor Interface

**PART- D: (Minimum of 2 Experiments has to be performed) Conduct the following experiments using ARM CORTEX M3 PROCESSOR USING KEIL MDK ARM**

1. Write an assembly program to multiply of 2 16-bit binary numbers.
2. Write an assembly program to find the sum of first 10 integers numbers
3. Write a program to toggle LED every second using timer interrupt.
4. Internal serial FLASH memory through SPI communication and perform erase, write, and read operations.

Equipment Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. 8086 Microprocessor kits
4. 8051 microcontroller kits
5. ADC module, DAC module
6. Stepper motor module
7. Key board module
8. LED, 7-SegemtUnits
9. Digital Multi-meters
10. ROM/RAM Interface module
11. Bread Board etc.
12. ARM CORTEX M3
13. KEIL MDKARM, Digital Multi-meters

REFERENCE(S):

Department Laboratory Manual.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**
**COURSE STRUCTURE AND SYLLABUS**

**Semester: VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE7E01 | Electrical Distribution Systems | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Describe the various classifications of distribution system.
CO2 : Analyze the distribution substations & design of distribution feeders
CO3 : Determine the voltage drop and power loss.
CO4 : Analyze the distribution system protection and its coordination.
CO5 : Analyze the effect of compensation for power factor improvement, the effect of voltage control.

**SYLLABUS**

**UNIT-I : Distribution Systems**

**Introduction to distribution systems:** Classification of Distribution Systems, design features of Distribution Systems, radial Distribution, ring main Distribution, Voltage drop calculations: DC Distributors for following cases: radial DC distributor fed at one end and at both ends (equal and unequal voltages), ring main distributor, stepped distributor and AC distribution, Comparison of AC and DC distribution system, Classification of Loads (Residential, Commercial, Agricultural & Industrial).

**UNIT-II : Substations & Distribution Feeders**

**Substation**: Location of substations: Rating of distribution substation, Service area with n Primary feeders, Methods & Benefits of optimal location of substations,

Air Insulated & GIS substation – (Qualitative treatment only)

**Distribution Feeders:** Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels- Feeder loading – Basic design practice of secondary distribution system.

**UNIT-III : System Analysis**

Voltage drops and power–loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems - Three phase balanced primary lines.

**UNIT-IV : Protection & Coordination**

Objectives of distribution system protection – Types of common faults and procedure for fault calculations for distribution system – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionalizers and circuit breakers. Coordination of protective devices: coordination procedure – Various types of coordinated operation of protective devices.

**UNIT-V : Power Factor Improvement and Voltage Control**

Capacitive compensation for power factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction- Capacitor allocation – Economic justification – Procedure to determine the best capacitor location.

**Voltage Control:** Equipment for voltage control– Effect of series capacitors, Effect of AVB/AVR-Line drop compensation-Numerical problems.

**TEXTBOOKS:**

1. Turan Gonen, Electric Power Distribution system, Engineering – 3rd Ed., by McGraw–hill Book Company. 2014
2. Sivanagaraju & Sankar, Electrical Power Distribution Automation 3rd Ed., Dhanpatrai & Sons.2015.

**REFERENCE BOOKS**:

1. Dale Patrick.R and Stephen Fardo.W Electrical Distribution Systems, 2nd Ed., CRC press, 2021.
2. Pabla. A. S, Electric Power Distribution, 7th ed., Tata McGraw–hill Publishing company.2001
3. Kamaraju. V, Electrical Distribution Systems 8th Ed., Right Publishers.2014.

**WEBLINKS:**

1. https://www.sciencedirect.com/topics/engineering/electric-power-distribution
2. https://www.sciencedirect.com/topics/engineering/distributed-energy-system
3. https://www.sciencedirect.com/topics/engineering/distribution-system
4. https://www.researchgate.net/figure/Three-links-on-a-power-distribution-line_fig1_263358872
5. https://electrical-engineering-portal.com/primary-secondary-distribution-systems

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | | | | **Semester: VII** |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| 20EE7E02 | **DC Drives** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Explain electric drive and different electric braking methods

CO2 : Demonstrate the 1-Phase half, fully controlled, Dual converter fed DC motor drives

CO3 : Demonstrate the 3-Phase half, fully controlled fed DC motor drives

CO4 : Describe the converter control of DC motors in various quadrants of operation

CO5 : Analyze the Design of Current & speed controllers

**SYLLABUS**

**UNIT-I : Fundamentals of Electric Drives**

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

**UNIT-II : Controlled Converter Fed DC Motor Drives**

1-phase half and fully controlled converter fed separately and self-excited DC motor drive – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Principle of operation of dual converters and dual converter fed DC motor drives -Numerical problems.

**UNIT-III : Controlled Bridge Rectifier (3-Φ) with DC Motor Load**

Three phase semi converters for continuous and discontinuous modes of operation – power and power factor-Three phase full converter for continuous and discontinuous modes of operation – power and power factor

**UNIT-IV : DC–DC Converters Fed DC Motor Drives**

Single quadrant – Two quadrant and four quadrant DC-DC converter fed separately excited and self-excited DC motors – Continuous current operation – Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics – Four quadrant operation – Closed

loop operation (qualitative treatment only).

**UNIT-V : Current and Speed controlled DC Motor drives**

Current and Speed controllers - current and speed feedback — Design of Current and Speed controllers

**TEXT BOOKS:**

1. Dubey G. K, Fundamentals of Electric Drives, Narosa Publications,
2. Krishnan R., Electric motor drives modeling, Analysis and control 1st ed., PHI.

**REFERENCE BOOKS:**

1. Shepherd, Hulley, Liang Power Electronics and motor control 2nd ed., CU Press
2. Rashid M.H., Power Electronic Circuits, Devices and. Applications 1st ed., PHI.
3. Dewan S.B., and A. Straughen A., Power Semiconductor drives – 1975.

WEB LINKS:

1. https://pdfcoffee.com/fundamentals-of-electrical-drives-gk-dubey-1-pdf-free.html
2. https://studymaterialz.in/electric-motor-drives-modeling-analysis-and-control-by-krishnan/
3. http://bspublications.net/downloads/05114cfbdad31c_Electrical%20&%20Electronics%20Engineering.pdf

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | | | | **Semester: VII** |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| 20EE7E03 | **Biomedical Engineering** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Expressing the fundamentals of Biomedical Engineering

CO2 : Illustrate the Electrodes and Transducers

CO3 : Demonstrate the Cardiovascular System and Measurements

CO4 : Analyze Patient Care and Monitoring

CO5 : Analyze Diagnostic Techniques and Bio-Telemetry

**SYLLABUS**

**UNIT-I : Introduction to Biomedical Instrumentation**

Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring aLiving System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

**UNIT-II : Electrodes and Transducers**

Introduction, Electrode Theory, Biopotential Electrodes,Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

**UNIT-III : Cardiovascular System and Measurements**

The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography. **Measurements In The Respiratory System:** The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

**UNIT-IV : Patient Care and Monitoring**

Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients,

Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

**Therapeutic and Prosthetic Devices**: Audiometers and Hearing Aids. Myoelectric Arm, Laparoscope, Ophthalmology Instruments, Anatomy of Vision, Electro physiological Tests, Ophthalmoscope, Tonometer for Eye Pressure Measurement. Diathermy, Clinical Laboratory Instruments, Biomaterials, Stimulators.

**UNIT-V : Diagnostic Techniques and Bio-Telemetry**

Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

**TEXT BOOKS:**

1. Onkar N. Pandey & Rakesh Kumar Bio-Medical Electronics and Instrumentation, 1st Ed., 2002
2. Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred J., Weibell and Erich A. Pfeiffer, 2nd Ed., book, PHI, 2018.

**REFERENCE BOOKS:**

1. Joseph J. Carr, John M. Brown, Introduction to Bio-Medical Equipment Technology, 4th Ed. Pearson Publications.
2. Kandapur R.S, Hand Book of Bio-Medical Instrumentation, 3rd Ed., 2014.

WEB LINKS:

http://www.gvpce.ac.in/syllabi/B.Tech15-16/OE/Biomedical%20Instrumentation15-16.pdf

https://vdoc.pub/documents/biomedical-instrumentation-and-measurements-3232sue338jg

https://archive.org/details/introductiontobi0000carr

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester:VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC7E05** | **VLSI Systems** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | To Understand the fabrication process of different MOS technologies and the operation of MOS devices |
| CO2 | : | Describe the general steps required for processing of VLSI design anddevelop the Stick and Layout designs |
| CO3 | : | Apply the circuit concepts and scaling models to find the performance of MOS circuits. |
| CO4 | : | To impart in-depth knowledge about static and dynamic CMOS design |
| CO5 | : | To Understand the FPGA Design Flow and Advanced Technologies |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Introduction And Basic Electrical Properties of Mos Circuits** |
| VLSI Design Flow, Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. $I_{ds}$ versus $V_{ds}$ Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology, MOS Layers, Stick Diagrams, Design Rules and Layout, Layout Diagrams for MOS circuits | | |
| **UNIT-II** | **:** | **Basic Circuit Concepts and Scaling of Mos Circuits** |
| **Basic Circuit Concepts:** Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, some area Capacitance Calculations, The Delay Unit, Inverter Delays, driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.<br>**Scaling Of Mos Circuits:** Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic. | | |
| **UNIT-III** | **:** | **Basic Building Blocks of Analog IC Design** |
| Regions of operation of MOSFET, Modelling of transistor, body bias effect, biasing styles, single stage amplifier with resistive load, and single stage amplifier with diode connected load, Common Source amplifier, Common Drain amplifier, Common Gate amplifier, current sources and sinks. | | |
| **UNIT-IV** | **:** | **CMOS Combinational And Sequential Logic Circuit Design** |

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| | | |
|---|---|---|
| **Static CMOS Design:** Complementary CMOS, Rationed Logic, Pass-Transistor Logic. **Dynamic CMOS Design:** Dynamic Logic-Basic Principles, Speed and Power Dissipation of Dynamic Logic, Issues in Dynamic Design, Cascading Dynamic Gates, Choosing a Logic Style, Gate Design in the Ultra Deep-Submicron Era, Latch Versus Register, Latch based design, timing decimation, positive feedback, instability, Meta stability, multiplexer based latches, Master-Slave Based Edge Triggered Register, clock to q delay, setup time, hold time, reduced clock load master slave registers, Clocked CMOS register. Cross coupled NAND and NOR, SR Master Slave register, Storage mechanism, pipelining | | |
| **UNIT-V** | **:** | **FPGA DESIGN** |
| **FPGA DESIGN:** FPGA design flow, Basic FPGA architecture, FPGA Technologies, Introduction to FPGA Families. **INTRODUCTION TO ADVANCED TECHNOLOGIES:** Giga-scale dilemma, Short channel effects, High–k, Metal Gate Technology, FinFET, TFET | | |

**TEXT BOOKS:**

1. Kamran Eshraghian, Douglas and A.Pucknell and SholehEshraghian - Essentials of VLSI Circuits and Systems, Prentice-Hall of India Private Limited, 2005.
2. Behzad Razavi - Design of Analog CMOS Integrated Circuits, McGraw Hill, 2003.
3. Jan M.Rabaey, AnanthaChandrakasan and Borivoje Nikolic- Digital Integrated Circuits, 2nd Ed., 2016.

**REFERENCE BOOKS**:

1. John P.Uyemura, John Wiley&Sons - Introduction to VLSI Circuits and Systems, 2009.
2. Vinod Kumar Khanna - Integrated Nano electronics: Nano scale CMOS, Post-CMOS and Allied Nano technologies, 1st Ed., Springer India, 2016.
3. Colinge JP- Fin-FETs and other multi-gate transistors, Springer, 2008

| Programme: EEE | | | | | Semester-VII |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| **20CS7E06** | **COMPUTER NETWORKS** | 3 | 0 | 0 | 3 |
| Subject Category:PEC | | | | | |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Learn various Network topologies and Network models and transmission media. |
| CO2 | : | Describe error detection, Flow control mechanisms and Multiple access protocols. |
| CO3 | : | Understand different Routing technologies involved to route packets |
| CO4 | : | Distinguish the standard Internet Protocol (IP), Transport Control Protocol (TCP) and User Datagram Protocol for Internet. |
| CO5 | : | Analyze and understand application layer protocols. |

**SYLLABUS**

| **UNIT-I** | **:** | **Computer Networks**: |
|---|---|---|
| Uses of Computer Networks, Network Hardware, Network Software, Types of networks, Network topologies, Layered architecture. Reference Models: OSI, TCP/IP, ARPANET, Internet, and ATM header, Reference model, QoS.<br>**Physical Layer:** Guided Transmission Media, Wireless Transmission Media, Communication Satellites. Switching and Multiplexing, Mobile Telephone Network, GSM. | | |
| **UNIT-II** | **:** | **Data Link Layer**: |
| Design Issues, Framing, Error Detection, Elementary Data Link Protocol and Sliding Window Protocols.<br>**Medium Access sub layer**: Static vs. Dynamic, Multiple Access Protocols: ALOHA, CSMA and Collision Free Protocols. Ethernet (IEEE802.3). | | |
| **UNIT-III** | **:** | **The Network Layer**: |
| Network Layer Design Issues, Routing Algorithms-Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast routing, multicast routing, Congestion control algorithms, Quality of Service Application Requirements, Traffic Shaping, Packet Scheduling, Internetworking, The Network Layer in the Internet-The IP version 4.0 protocol, IP Addresses, IP Version 6.0, Internet Control Protocols. | | |

| | | |
|---|---|---|
| **UNIT-IV** | **:** | **The Transport Layer**: |
| The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols –Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Congestion control-Desirable Bandwidth allocation, Regulating the sending rate, The Internet Transport Protocols: Introduction to UDP, Remote procedure call, Real-Time transport protocols, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release. | | |
| **UNIT-V** | **:** | **The Application Layer**: |
| DNS- The Domain Name System, Electronic mail, world wide web. FTP, HTTP, TELNET. | | |

**Text Books:**

1. Andrew S Tanenbaum, Computer Networks -,4th Ed, Pearson Education/PHI
2. BehrouzA.Forouzan DataCommunicationsandNetworking,3rd Ed TMH

**ReferenceBooks:**

1. Keshav.S, Engineering Approach to Computer Networks, 2nded, Pearson Education.
2. Shay W.A,Thomson, Understanding communications and Networks,3rded.
3. Dr..Bapiraju.G.S, Computer Networks–,2nded,GRIETPublications.

| | | | | | **Semester:VII** |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| **20EE7E04** | **SOLAR AND WIND ENERGY SYSTEMS** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

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

CO1 : Explain The basic concepts of solar energy, solar radiation and fundamentals of wind turbines.

CO2 : Design Different types of Solar cells, Solar power systems

CO3 : Explain working of wind turbines

CO4 : Explain Wind Energy Conversion Systems

CO5 : Analyze Grid integration requirements for Hybrid systems

**SYLLABUS**

**UNIT-I : Basic concepts of solar energy & solar cells**

Introduction to solar energy. Terrestrial and Extraterrestrial Solar Radiation. Characteristics of Solar Radiation & Radiation Spectrum. Solar Constant. Air mass ratio. Geometry of Earth and Sun. Atmospheric effects on solar radiation. Solar radiation measurement & Instrumentation, Basic operation & working principle of solar cells, Types of Solar Cells - Mono crystalline & Poly crystalline.

**UNIT-II : Solar cell characteristics, BOS and classification of PV systems**

Solar cell I-V characteristics. Maximum Power Point. Cell efficiency & Fill factor. Effect of Irradiation and Temperature. Principles of Maximum Power Point Trackers, P&O algorithm, PV Arrays and Modules. Balance of Systems (BOS)- Inverters, Batteries, Charge controllers. Classification of PV Systems - Stand- alone PV system

**UNIT-III : Fundamentals of wind turbines**

Power contained in wind - Efficiency limit for wind energy conversion - Design of wind turbine rotor: Diameter of the rotor - Choice of number of blades - Wind Turbine Parts and Functions - Power speed characteristics - Types of Wind Turbine: Horizontal Axis Wind Turbine, Vertical Axis Wind Turbines - Torque speed characteristics. Wind turbine control systems - Pitch angle control, Stall control, Yaw control.

**UNIT-IV : Wind Energy Conversion Systems**

Wind Energy Conversion systems(WECS) , Components of WECS, Induction Generators-Basic Principle of operation , Types of Wind Turbine Generators – Type 1, Type 2 , Type 3, Type 4, Type 5, Doubly Fed Induction Generators, Grid-connected variable speed wind power system.

**UNIT-V : Grid integration of Hybrid Solar Wind System:**

Grid Interactive PV System – grid connected variable speed wind power system- Interface Requirements , Synchronizing with Grid - Hybrid solar wind system - Advantages and Disadvantages - Inrush Current, Inrush Current, Load Transient, Safety- Energy Storage and Load Scheduling - Hybrid solar and wind system with battery storage.

**TEXT BOOKS:**

1. Bhardra.S.N, Kastha.D and Banerjee.S,Wind Electrical Systems, Oxford University Press,2013
2. Masters.G.M, Renewable and Efficient Electric Power Systems,2nd Ed John Wiley and Sons, 2004.
3. Mukund R. Patel,Wind and Solar Power Systems,2nd Ed CRC Press Boca Raton-London-New York, Washington, D.C. 1999.
4. Sumathi.S ,Ashok.L, Kumar & Suresh.P, Springer, Solar PV and Wind Energy Conversion Systems, Cham, Springer International Publishing, 2015

**REFERENCE BOOKS:**

1. Siegfried.H and Waddington.R, John Wiley Grid integration of wind energy conversion systems,2nd Ed, and Sons Ltd, 2006.
2. Ackermann.T, Wind Power in Power Systems,2nd Ed, John Wiley and Sons Ltd, 2012.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

| Semester: VII | | | | | |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| 20EE7E05 | **AC DRIVES** | 4 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Explain the fundamentals of AC Electric drives

CO2 : Analyze the Stator side control of 3-phase Induction motor Drive

CO3 : Analysis of Rotor side control of 3-phase Induction motor Drive

CO4 : Design the control of Synchronous motor drives

CO5 : Analyze the design of Current & speed controllers

**SYLLABUS**

**UNIT-I : Introduction to AC drives**

Introduction to motor drives-torque production- Equivalent circuit analysis-Speed-Torque characteristics with variable voltage operation, variable frequency operation, constant v/f operation-Induction motor characteristics in constant torque and field weakening regions.

**UNIT-II : Stator side control of 3-phase Induction motor Drive**

Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by PWM voltage source inverter – Closed loop v/f control of induction motor drives (qualitative treatment only).

**UNIT-III : Rotor side control of 3-phase Induction motor Drive**

Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages –Applications.

**UNIT-IV : Control of Synchronous motor Drives**

Separate control of synchronous motor – self-control of synchronous motor employing load commutated thyristor inverter - closed loop control of synchronous motor drive – PMSM (Basic operation only).

**UNIT-V : Controllers**

Flux weakening operation- Maximum Speed-Direct flux weakening algorithm – Constant torque mode controller- Flux Weakening controller- Maximum permissible torque-Speed control scheme-Implementation strategy – Speed controller design

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**TEXT BOOKS:**

1. Dubey G. K, Fundamentals of Electric Drives, Narosa Publications.
2. Krishnan R., Electric motor drives modeling, Analysis and control 1st Edition , PHI.
3. Bose B.K, Modern Power Electronics and AC drives, 1ST Edition , Pearson Publication

**REFERENCE BOOKS:**

1. MD Murphy & FG Turn Bull, Power Electronic Control of AC motors, 1st Edition, Pergman Press
2. M.H Rashid, Power Electronics Circuits, Devices and Application, PHI, 1995

WEB LINKS:

1. https://syllabusguru.com/fundamentals-of-electric-drives-by-gk-dubey-pdf/
2. https://www.academia.edu/38989807/Power_Electronics_Circuits_Devices_and_Applications_By_Muhammad_H_Rashid
3. https://www.semanticscholar.org/paper/Power-Electronic-Control-of-Ac-Motors-Murphy-Turnbull/a37819da1114a1b686892168a66bd493ba507fb7

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**
**COURSE STRUCTURE AND SYLLABUS**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: VII |
| Course Code | Course Name | L | T | P | C |
| 20EE7E06 | **Digital Control System** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Define Digital control systems, A/D and D/A conversion

CO2 : Apply z–transformations to different systems

CO3 : verify controllability and Observability of the system

CO4 : Determine the stability for digital control systems

CO5 : Analyze digital control systems using w-plane

**SYLLABUS**

**UNIT-I : Introduction and signal processing**

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Continuous and Discrete Time Signals – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

**UNIT-II : z–transformations**

z–Transforms – Theorems – Finding inverse z–transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

**UNIT-III : State space analysis and the concepts of Controllability and observability**

State space representation of discrete time systems – Solving Discrete Time state space equations – State transition matrix and its properties – Discretization of continuous time state equations – Concepts of controllability and observability – Tests (without proof).

**UNIT-IV : Stability analysis**

Mapping between the s–Plane and the z–Plane – Primary strips and Complementary strips – Stability criterion – Modified Routh's stability criterion and Jury's stability test.

**State Feedback Controllers and State Observers-** Design of state feedback controller through pole placement – Necessary and sufficient conditions– Ackerman's formula – Design of state observers (Full Order and Reduced Order)

**UNIT-V : Design of discrete–time control systems by conventional methods**

Transient and steady state specifications – Design based on Root locus technique- Design using frequency response in the w–plane for lag and lead compensators

**TEXT BOOK:**

1. K. Ogata, Discrete–Time Control systems, Pearson Education/PHI, 2nd Edition. 1995.
2. M.Gopal, Digital Control and State Variable Methods , 4th Edition, TMH,2012.

**REFERENCE BOOKS:**

1. Kuo, Digital Control Systems, Oxford University Press, 2nd Edition, 2003.

WEB LINKS:

1. https://kupdf.net/download/digital-control-and-state-variable-methods-by-m-gopal_5905bacedc0d600a56959f01_pdf
2. http://faculty.tafreshu.ac.ir/file/download/course/1569775703-katsuhiko-ogata-discrete-time-control-systems-pie-pearson-education-1994-.pdf

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester:VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EC7E06** | **Embedded Systems and Applications** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Relating the basic concepts of embedded systems are introduced. |
| CO2 | : | Analyze various elements of embedded hardware and their design principles |
| CO3 | : | Design and development of firmware for embedded systems is elaborated |
| CO4 | : | Estimating the Real-Time operating system and the fundamentals of RTOS based embedded firmware design and testing tools are discussed |
| CO5 | : | Adapting the real time applications and develop the basic Programming |

**SYLLABUS**

| **UNIT-I** | **:** | **Characteristics of an embedded system** |
|---|---|---|

**Introduction:** Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, Memory, Sensors and Actuators, Communication Interface, Embedded firmware.

**Characteristics of an embedded system**: Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

| **UNIT-II** | **:** | **Embedded Hardware Design** |
|---|---|---|

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

| **UNIT-III** | **:** | **Embedded Firmware Design** |
|---|---|---|

Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

| **UNIT-IV** | **:** | **Embedded System Development** |
|---|---|---|

**Real Time Operating System:** Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization, Device Drivers.

| | | |
|---|---|---|
| **Embedded System Development:** The integrated development environment, Types of files generated on cross-compilation, Deassembler / Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools. | | |
| **UNIT-V** | **:** | **Real Time Applications** |
| **Real Time Applications: Digital** camera hardware and software architecture, embedded systems in automobile, embedded system for a smart card, mobile phone software for key inputs.<br><br>**Basic Programming Using Keil and Proteus**: LED interfacing programming using CC and CA, traffic light management system, Seven segment display. | | |

**TEXT BOOKS:**

1. Tammy Noergaard - Embedded Systems Architecture, Elsevier Publications, 2013.
2. Shibu.K.V - Embedded Systems, Tata McGraw Hill Education Private Limited, 2013.

**REFERENCE BOOKS**:

1. Frank Vahid, Tony Givargis - Embedded System Design, John Wiley Publications, 2013.
2. Lyla B.Das - Embedded Systems, Pearson Publications, 2013.

| Prpgramme: EEE | | | | | Semester:VII |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| **20IT7E06** | **PRINCIPLES OF SOFTWARE ENGINEERING** | 3 | 0 | 0 | 3 |
| Subject Category:PEC | | | | | |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Identification And Analysis of Different Life Cycle Phases. |
| CO2 | : | Prepare Good SRS for a Software project. |
| CO3 | : | Estimation of a Software Project |
| CO4 | : | Understand the process of Design engineering. |
| CO5 | : | Develop and apply different testing techniques. |

**SYLLABUS**

| **UNIT-I** | **:** | **The Software Problem and Process** |
|---|---|---|
| Software development Process Models: Waterfall, Prototype, Iterative Development, Rational Unified Process, Time boxing Model, Extreme Programming and Agile Process, Unified Process Models, Software Management Process. | | |
| **UNIT-II** | **:** | **Software Requirement Analysis and Specification** |
| Value of good SRS, Requirements Specification, and Functional specification with Use cases, other approaches for analysis, Data flow diagrams, Entity relationship Diagrams, Validation. | | |
| **UNIT-III** | **:** | **Planning A Software Project** |
| Effort Estimation, Project Scheduling and Staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling. | | |
| **UNIT-IV** | **:** | **Design** |
| Design Concepts: Cohesion, Coupling, Functional oriented design: Structured chart, Structured design methodologies, Examples, Object Oriented Design: OO concepts, UML, Design Methodology, Examples, Detailed design: Logic/Algorithm Design, State Modeling of Classes, Verification, Metrics: Metrics for Object Oriented Design, Metrics for Functional Oriented Design. | | |
| **UNIT-V** | **:** | **Software Testing Strategies:** |
| A strategic approach to software testing, strategic issues, test strategies for conventional | | |

| |
|---|
| software, validation testing, system testing. |

**Text books:**

1. Pankaj Jalote , Software Engineering a precise approach, Wiley Publications.

**Reference books:**

1. Roger S. Pressman, Software Engineering, A practitioner's Approach- 6th ed. McGraw Hill International Edition.
2. Sommerville, Software Engineering, 7th ed, Pearson Education.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**
**COURSE STRUCTURE AND SYLLABUS**

**Semester: VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE7E07 | Flexible AC Transmission systems | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Learn the basics of power flow control in transmission lines using FACTS controllers

CO2 : Distinguish functional Requirements of shunt and series compensators.

CO3 : Describes the method of shunt compensation using static VAR compensators.

CO4 : Learn the methods of compensation using series compensators.

CO5 : Learn the methods of compensation using combined compensators

**SYLLABUS**

**UNIT-I : Introduction to FACTS**

Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers. Requirements and characteristics of high-power devices – Voltage and current rating – Losses and speed of switching – Parameter trade–off devices.

**UNIT-II : Objectives of shunt and Series Compensation**

Objectives of Shunt Compensation- Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping. Objectives of Series Compensation- Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements

**UNIT-III : Shunt Compensators**

Methods of Controllable Var Generation -Variable Impedance type VAR generator - Thyristor Switched/Controlled Reactor (TSR/TCR) – Thyristor Switched Capacitor (TSC) – Fixed Capacitor–Thyristor Controlled Reactor (FC-TCR), Thyristor Switched Capacitor and Thyristor Controlled Reactor (TSC–TCR), Switching Converter type VAR generator – Understanding of principle of operation of SVC and STATCOM.

**UNIT-IV : Series Compensators (Qualitative Treatment)**

Variable Impedance Type Series Compensators- GTO thyristor-controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC) - Switching Converter type Series Compensation.

**UNIT-V : Combined Controllers (Qualitative Treatment)**

Voltage and Phase Angle Regulator -TCVR and TCPAR – Switched Converter Based Voltage Phase Angle Regulator - Schematic and basic operating principles of Unified Power Flow Controller (UPFC), Interline Power Flow Controller (IPFC) - Application on transmission lines

**TEXTBOOKS:**

1. Hingorani, N. G., Gyugyi, L. Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems. (2001). India: IEEE Press.

**REFERENCE BOOKS:**

1. Yong Hue Song and Allan T Johns, Flexible ac transmission system (FACTS), Institution of Electrical Engineers, London.
2. R.Mohan Mathur and Rajiv k.Varma, Thyristor-based FACTS Controllers for Electrical Transmission Systems, Wiley.

**WEBLINKS:**

1. https://www.siemens-energy.com/global/en/offerings/power-transmission/
2. https://www.gegridsolutions.com/facts.htm

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Semester: VII |
| Course Code | Course Name | L | T | P | C |
| 20EE7E08 | **Electrical & Hybrid Vehicles** | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

CO1 : Know the concept of electric vehicles

CO2 : Know the concept of hybrid electric vehicle

CO3 : Familiar with different configuration of hybrid electric vehicles

CO4 : Understand the power converters used in hybrid electric vehicles

CO5 : Know different batteries and other energy storage systems.

**SYLLABUS**

**UNIT-I : Introduction**

Fundamentals of vehicle, components of conventional vehicle and propulsion load; Drive cycles and drive terrain; Concept of electric vehicle and hybrid electric vehicle; History of hybrid vehicles, advantages and applications of Electric and Hybrid Electric Vehicles, different Motors suitable for of Electric and Hybrid Electric Vehicles.

**UNIT-II : Hybridization of Automobile**

Architectures of HEVs, series and parallel HEVs, complex HEVs. Plug-in hybrid vehicle, constituents of PHEV, comparison of HEV and PHEV; Fuel Cell vehicles and its constituents.

**UNIT-III : Plug-in Hybrid Electric Vehicle**

PHEVs and EREVs blended PHEVs, PHEV Architectures, equivalent electric range of blended PHEVs; Fuel economy of PHEVs, power management of PHEVs, end-of-life battery for electric power grid support, vehicle to grid technology, PHEV battery charging

**UNIT-IV : Power Electronics in HEVs**

Rectifiers used in HEVs, voltage ripples; Buck converter used in HEVs, non-isolated bidirectional DC-DC converter, voltage source inverter, current source inverter, isolated bidirectional DC-DC converter, PWM rectifier in HEVs, EV and PHEV battery chargers.

**UNIT-V : Battery and Storage Systems**

Energy Storage Parameters; Lead–Acid Batteries; Ultra capacitors; Flywheels - Superconducting Magnetic Storage System; Pumped Hydroelectric Energy Storage; Compressed Air Energy Storage - Storage Heat; Energy Storage as an Economic Resource

**TEXTBOOKS:**

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

**REFERENCE BOOKS:**

1. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
3. H. Partab: Modern Electric Traction - DhanpatRai& Co, 2007.
4. Pistooa G., “Power Sources, Models, Sustainability, Infrastructure and the market”, Elsevier 2008
5. Mi Chris, Masrur A., and Gao D.W., “Hybrid Electric Vehicle: Principles and Applications with Practical Perspectives” 1995.

WEB LINKS:

1. https://www.academia.edu/42039730/Advanced_Electric_Drive_Vehicles
2. https://vdoc.pub/documents/electric-and-hybrid-vehicles-design-fundamentals-31ssv6vqkbt0
3. http://www.iqytechnicalcollege.com/BAE%20685-Electric%20Vehicle%20Technology.pdf

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

Semester: VII

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EE7E09 | Industrial Automation | 3 | 1 | 0 | 4 |

**COURSE OUTCOMES:**

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

CO1 : Analyze the main functional units in a PC and its characteristics

CO2 : Learn the basics of PLC and its programming

CO3 : Apply different PLC functions to applications

CO4 : Analyze the applications of PLC

CO5 Learn the basics of SCADA.

**SYLLABUS**

**UNIT-I : Concept of Industrial Automation**

Benefits of industrial automation system-functions of the given components of automation system-characteristics-applications.

**UNIT-II : PLC Fundamentals**

Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators. **Basic PLC programming:** Programming On-Off inputs/ outputs. Creating Ladder diagrams, Basic PLC functions, PLC Basic Functions, register basics, timer functions, counter functions.

**UNIT-III : PLC intermediate and advanced functions**

Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions. PLC Advanced functions: Analog PLC operation, Networking of PLC

**UNIT-IV : Application of PLC**

Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating

**UNIT-V : Scada Basics**

Computer Process interface for Data Acquisition and control – Computer control loops. – Supervisory Digital Control (SCADA) - introduction and brief history of SCADA – SCADA Hardware and software – Landlines for SCADA – use of modems in SCADA – SCADA with LAN

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**TEXT BOOKS:**

1. John. W, Webb Ronald A Reis, Programmable Logic Controllers – Principles and Applications, 5th ed, Prentice Hall Inc, New Jersey, 2002.
2. Chidambaram. M, Narosa, Computer Control of Processes, Standard Edition –2006.

**REFERENCE BOOKS**:

1. Gary Dunning Thomson Delmar, Introduction to Programmable Logic Controllers – Learning2nd Ed Second reprint 2003.
2. Gary Dunning Thomson Delmar, PC Based Instrumentation and Control, 3rd Ed by Mike Tooley; Elsevier.

**WEB LINKS:**

**https://pdfcoffee.com/qdownload/introduction-to-programmable-logic-controllers-pdf-free.html**

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester:VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20EC7E07 | Digital Image and Video Processing | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | Understand the concepts of Image Segmentation |
| CO2 | : | Attain Knowledge on Special Domain Methods |
| CO3 | : | Explain the Image compression fundamentals |
| CO4 | : | Illustrate Basic Steps of Video Processing |
| CO5 | : | Able to Estimate the Optical Flow Methodologies |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Fundamentals of Image Processing and Image Transforms** |
| Basic steps of Image Processing System Sampling and Quantization of an image, Basic relationship between pixels. Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Thresholding, Region based segmentation. | | |
| **UNIT-II** | **:** | **Image Enhancement** |
| Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering. | | |
| **UNIT-III** | **:** | **Image Compression** |
| Image compression fundamentals – Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Huffman coding, , Bit plane coding, Transform coding, Predictive coding, Wavelet coding, Lossy Predictive coding, JPEG Standards. | | |
| **UNIT-IV** | **:** | **Basic Steps of Video Processing** |
| Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, filtering operations. | | |
| **UNIT-V** | **:** | **2-D Motion Estimation** |
| Optical flow, General Methodologies, Pixel Based Motion Estimation, Block Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding. | | |

**TEXT BOOKS:**

1. Gonzalez and Woods, Digital Image Processing, 3rd Ed., Pearson.
2. Yao Wang, Joem Ostermann and Ya–quin Zhang, Video Processing and Communication, 1st Ed., PH Int.

**REFERENCE BOOKS**:

- Gonzalez and Woods, Digital Image Processing using MATLAB, 2nd Ed., Mc Graw Hill, 2010.
- Milan Sonka, Vaclan Hlavac, Image Processing Analysis and Machine Vision, 3rd Ed., CENGAGE, 2008.
- A Murat Tekalp, Digital Video Processing, Pearson, 2010.
- S.Jayaraman, S.Esakkirajan, T.Veera Kumar, Digital Image Processing , TMH, 2009.

| Programme: EEE | | | | | Semester:VII |
|---|---|---|---|---|---|
| Course Code | Course Name | L | T | P | C |
| **20IT7E07** | **BIG DATA** | 3 | 0 | 0 | 3 |
| Subject Category: PEC | | | | | |

**COURSE OUTCOMES:**

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

| | | |
|---|---|---|
| CO1 | : | learn to analyze the big data using intelligent techniques |
| CO2 | : | introduce programming tools PIG |
| CO3 | : | Illustrate big data challenges in different domains including social media |
| CO4 | : | transportation, finance and medicine Use various techniques for mining data stream |
| CO5 | : | Design and develop Hadoop |

**SYLLABUS**

| | | |
|---|---|---|
| **UNIT-I** | **:** | **Introduction: Introduction to Big Data:** |
| Introduction to Big Data Platform, Challenges of Conventional Systems, Intelligent data analysis, Nature of Data, Analytic Processes and Tools, Analysis vs Reporting. | | |
| **UNIT-II** | **:** | **Stream Processing:** |
| Mining data streams: Introduction to Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP) Applications, Case Studies - Real Time Sentiment Analysis - Stock Market Predictions. | | |
| **UNIT-III** | **:** | **Introduction to Hadoop:** |
| Hadoop: History of Hadoop, the Hadoop Distributed File System, Components of Hadoop Analysing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS, Java interfaces to HDFS Basics, developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features Hadoop environment. | | |
| **UNIT-IV** | **:** | **Frameworks and Applications:** |
| Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, Hive QL, Querying Data in Hive, fundamentals of HBase and Zoo Keeper. | | |
| **UNIT-V** | **:** | **Predictive Analytics And Visualizations:** |
| Predictive Analytics and Visualizations: Predictive Analytics, Simple linear regression, Multiple linear regression, Interpretation of regression coefficients, Visualizations, Visual data analysis techniques, interaction techniques, Systems and application | | |

**Text Books:**

1) Tom White, Hadoop,The Definitive Guide, 4th ed,O'reilly Media, 2015.

2) Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012.

3) Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP, 2012.

**Reference Books:**

1) Bill Franks, "Taming the Big Data Tidal Wave, Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley& sons, 2012.

2) Paul Zikopoulos,DirkdeRoos, Krishnan Parasuraman,Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data:The IBM Big Data Platform,Tata McGraw Hill Publications, 2012.

3) ArshdeepBahga and Vijay Madisetti,Big Data Science & Analytics, A Hands on Approach , VPT, 2016.

4) Bart Baesens, Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series), John Wiley & Sons, 2014.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| 20SH7E01 | Entrepreneurship syllabus | 3 | 0 | 0 | 3 |

**COURSE OUTCOMES:**

**At the successful completion of the course, student shall be able to**

CO1 : To gain knowledge on Entrepreneurship and attain skills to become an entrepreneur

CO2 : To attain the competency of preparing business plans.

CO3 : To get awareness on different financial institutions that support entrepreneurs

CO4 : To know the various financial sources in establishing a venture

CO5 : To get awareness on various contemporary aspects of Social entrepreneurship.

**SYLLABUS**

**UNIT-1 : Entrepreneurship**

Concept, knowledge and skills requirement; Types of entrepreneurs, characteristic of successful entrepreneurs; role of entrepreneurship in economic development; entrepreneurship process; factors impacting emergence of entrepreneurship.

**UNIT-II : Business Plan & Marketing Plan**

**Business Plan**: Meaning, Purpose and Contents of a Business Plan; Business Planning Process - Methods of generating business ideas, Creative problem solving, opportunity recognition.

**Marketing Plan**: Marketing Research – Need and Significance; Industry Analysis; Competitor Analysis; Marketing Mix; Market Segmentation, Target Markets, Market Positioning;

**UNIT-III : Institutions supporting Entrepreneurs**

**Institutions supporting Entrepreneurs**: A brief overview of financial institutions in India - Central level and state level institutions - SIDBI - NABARD - IDBI - SIDCO - Indian Institute of Entrepreneurship - DIC - Single Window - Latest Industrial Policy of Government of India.

**UNIT-IV : Financial Aspects of Entrepreneurship**

**Financial Aspects of Entrepreneurship**: Need and sources of finance, Venture capital, Nature and Overview; Locating venture capitalists; Venture capital process; Incubation centers.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS**

**UNIT-V : Social entrepreneurship**

Social entrepreneurship - Rural entrepreneurship, MSME Policies. Make-In India, Start-Up India, Stand-Up India, Woman Entrepreneurship

**TEXT BOOKS:**

01. B. Janakiram, M. Rizwana, Entrepreneurship Development text &cases, ExcelBooks,New Delhi, 2011..
02. D. F Kuratko, T.V. Rao, Entrepreneurship – A south – Asian Perspective, Cengage Learning 2012.
03. Rajeev Roy, Entrepreneurship, Oxford University Press, 2010.
04. G.Shainesh Philip Kotler, Kevin lane Keller, Alexander Chernev, Jagdish N. Sheth, Marketing Management, 16th Edition, Pearson Education.
05. Michael E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors, Free Press; Illustrated edition
06. Richard Roberts, Finance for Small and Entrepreneurial Business, Routledge

**REFERENCE:**

01. S. S. Khanka, Entrepreneurial Development, S Chand & Company.
02. S A Kumar, S C Poornima, M K Abraham, K Jayshree, Entrepreneurship Development, New Age International Pvt Ltd
03. C. Paramasiva, T. Subramanian, Financial Management, New Age Publications

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20SH7E02** | **Business Environment** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

**At the successful completion of the course, student shall be able to**

CO1 : To Provide basic fundamentals of Indian business environment and enlighten the students on the Trends in business environment.

CO2 : To understand the Indian economic systems.

CO3 : The student will be able to learn the various policies of the government of India.

CO4 : To learn about various Indian legislations and acts influencing the growth and development Of the Indian economy.

CO5 : To understand the international business

**SYLLABUS**

**UNIT-1 : Business Environment**

Concept of Business Environment-Definition-Characteristics, Dimensions of Business Environment–challenges, Industrial policies of India, Environmental Scanning: Importance, Process of scanning.

**UNIT-II : Socio-Cultural Environment**

Economic system-different types of economic system- Socio-cultural factors influence on Business Decisions -Technological environment-Meaning- features-impact of Technology on Business Environment.

**UNIT-III : Economic Environment of Business**

Balance of Payments (BOP) -major components – Causes for disequilibrium in Balance of Payments. Fiscal Policy: Nature and significance – public revenues – expenditure- debt. Monetary policy: Objectives-Instruments of monetary policy.

**UNIT-IV : Legal environment**

Company Act - 2013, Memorandum and Articles of Association, Special features of the SICA Act - 1985- Consumer protection act - 1986; Environmental laws (air, water, sound).

**UNIT-V : International Business Environment**

world Bank, IMF, GATT- WTO: The WTO agreement, TRIPS, TRIMS, Non-tariff barriers and Dispute settlement mechanism, Foreign Investment Policy, EXIM Policy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

**TEXT BOOKS:**

1. Shaikh Saleem: "**Business Environment**", Parsons, New Delhi,

2. Veena Keshav Pailwar: "**Economic Environment of Business**", PHI Learning, New Delhi, 2012

3. Rosy Joshi, Sangam Kapoor: "**Business Environment**", Kalyani Publishers, New Delhi, 2011.

**REFERENCE:**

1. Aswathappa K: "**Essentials of Business Environment**", Himalaya Publishing House New Delhi, 2011.

2. Vivek Mittal: "**Business Environment Text and Cases**", Excel Books New Delhi, 2011

3. Raj Kumar: "**International Business Environment**", Excel Publication, New Delhi, 2012.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20SH7E03** | **Digital Marketing** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

**At the successful completion of the course, student shall be able to**

CO1 : To gain knowledge on Digital Marketing

CO2 : To attain the Channels of Digital Marketing

CO3 : To get awareness on Social media marketing

CO4 : To know the Web marketing

CO5 : To get awareness on Content creation & Freelancing.

**SYLLABUS**

**UNIT-1 : Basics of Digital Marketing**

Introduction, Need and Scope of Digital Marketing, Benefits of Digital Marketing, digital marketing vs traditional marketing. digital advertisements, visibility, engagement, traffic, inbound - outbound marketing,

**UNIT-II : Channels of Digital Marketing**

Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels

**UNIT-III : Social media marketing**

Optimization, social media analytics, product marketing in Google Ads, Instagram, Facebook, YouTube video marketing, Twitter campaign, LinkedIn campaign, remarketing; App Store Optimization.

**UNIT-IV : Web marketing**

Web development with Word Press, domain name, server, hosting, plugin, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost per-click), Search Engine Optimization, off-page optimization.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**UNIT-V : Content creation & Freelancing**

Content creation for online platforms- types of content, blogging, keyword planner. Social media influencers, connecting with influencers. Freelancing; email marketing, affiliate marketing, mobile marketing, and digital marketing automation.

**TEXT BOOKS:**

1. Chaffey, D., & Smith, P. R. (2017). Digital marketing excellence: planning, optimizing and integrating online marketing. Routledge.

2. Chaffey, D., & Ellis-Chadwick, F. (2019). Digital marketing. Pearson.

3. Charles worth, A. (2018). Digital marketing: A practical approach. Routledge.

**REFERENCE:**

1. Dodson, I. (2016). The art of digital marketing: the definitive guide to creating strategic, targeted, and measurable online campaigns. John Wiley & Sons.

2. Gupta, S. (2018). Digital marketing, McGraw-Hill Education.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester VII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20SH7E04** | **Human Resource Development & Organization Behavior** | **3** | **0** | **0** | **3** |

**COURSE OUTCOMES:**

**At the successful completion of the course, student shall be able to**

CO1 : To gain knowledge on Human Resource Management.

CO2 : To attain the Human Resource Development

CO3 : To get awareness on organizational behavior

CO4 : To know the Individual behavior

CO5 : To get awareness on group behavior

**SYLLABUS**

**UNIT-1 : Human Resource Management**

Introduction, Nature, Scope and Significance; Objectives of HRM; Functions of HRM; Job Analysis; Job Evaluation; Human Resource Planning (HRP) - Recruitment & Selection; Emerging trends in HRM.

**UNIT-II : Human Resource Development**

Introduction to HRD; HRD Functions – Training & Development, Management Development, Performance Appraisal; Roles and competencies of HRD professionals; Challenges in HRD.

**UNIT-III : Organizational behavior**

Introduction, Nature, scope and importance of organizational behavior; Organizational behavior Frame work; Organizational behavior models; Multidisciplinary nature of OB; Challenges and Opportunities for OB.

**UNIT-IV : Individual Behavior**

Perception – Meaning and Process; Impression management; Personality – Meaning, Theories and Personality Development; Attitude – Process and Formation; Motivation – Needs, Motives, Process and Theories of Motivation.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**UNIT-V : Group Behavior**

Groups - Types of Groups, Group Development Stages; Determinants of Group Performance; Organizational Conflicts – Types, Reasons and Consequences of Organizational Conflicts; Managing Organizational Conflicts.

**TEXT BOOKS:**

1. HRD, P.C.Tripathi, sulthan chand & sons

**REFERENCE:**

1. Organizational behavior, uma sekharan, second edition, Tata Mc graw hill companies.

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

## COURSE STRUCTURE AND SYLLABUS

**Semester VIII**

| Course Code | Course Name | L | T | P | C |
|---|---|---|---|---|---|
| **20EE8P01** | **PROJECT WORK/ INTERNSHIP IN INDUSTRY** | **0** | **0** | **0** | **12** |