Educational Objectives
Bachelor of Electrical and Electronics Engineering curriculum is designed to prepare the graduates having attitude and knowledge to
1. Have successful technical and professional careers in their chosen fields such as circuit theory, Field theory, control theory and computational platforms.
2. Engross in life long process of learning to keep themselves abreast of new developments in the field of Electronics and their applications in power engineering.

Programme Outcomes
The graduates will have the ability to
a. Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering.
b. Identify and formulate Electrical and Electronics Engineering problems from research literature and be ability to analyze the problem using first principles of Mathematics and Engineering Sciences.
c. Come out with solutions for the complex problems and to design system components or process that fulfill the particular needs taking into account public health and safety and the social, cultural and environmental issues.
d. Draw well-founded conclusions applying the knowledge acquired from research and research methods including design of experiments, analysis and interpretation of data and synthesis of information and to arrive at significant conclusion.
e. Form, select and apply relevant techniques, resources and Engineering and IT tools for Engineering activities like electronic prototyping, modeling and control of systems and also being conscious of the limitations.
f. Understand the role and responsibility of the Professional Electrical and Electronics Engineer and to assess societal, health, safety issues based on the reasoning received from the contextual knowledge.
g. Be aware of the impact of professional Engineering solutions in societal and environmental contexts and exhibit the knowledge and the need for Sustainable Development.
h. Apply the principles of Professional Ethics to adhere to the norms of the engineering practice and to discharge ethical responsibilities.
i. Function actively and efficiently as an individual or a member/leader of different teams and multidisciplinary projects.
j. Communicate efficiently the engineering facts with a wide range of engineering community and others, to understand and prepare reports and design documents; to make effective presentations and to frame and follow instructions.
k. Demonstrate the acquisition of the body of engineering knowledge and insight and Management Principles and to apply them as member / leader in teams and multidisciplinary environments.
l. Recognize the need for self and life-long learning, keeping pace with technological challenges in the broadest sense.

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## Professional Elective VI

### PRACTICALS
- Project Work

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### Professional Elective

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*Professional Electives are grouped according to elective number as was done previously.*
### HUMANITIES AND SOCIAL SCIENCES (HS)

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OBJECTIVES:
- To develop the basic reading and writing skills of first year engineering and technology students.
- To help learners develop their listening skills, which will enable them listen to lectures and comprehend them by asking questions; seeking clarifications.
- To help learners develop their speaking skills and speak fluently in real contexts.
- To help learners develop vocabulary of a general kind by developing their reading skills.

UNIT I SHARING INFORMATION RELATED TO ONESELF/FAMILY & FRIENDS

UNIT II GENERAL READING AND FREE WRITING
Reading - comprehension - pre-reading - post reading - comprehension questions (multiple choice questions and/or short questions/ open-ended questions) - inductive reading - short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts) - register. Writing - paragraph writing - topic sentence - main ideas - free writing, short narrative descriptions using some suggested vocabulary and structures. Listening - telephonic conversations. Speaking - sharing information of a personal kind - greeting - taking leave. Language development - prepositions, conjunctions. Vocabulary development - guessing meanings of words in context.

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT
Reading - short texts and longer passages (close reading) Writing - understanding text structure - use of reference words and discourse markers - coherence - jumbled sentences. Listening - listening to longer texts and filling up the table - product description - narratives from different sources. Speaking - asking about routine actions and expressing opinions. Language development - degrees of comparison - pronouns - direct vs indirect questions. Vocabulary development - single word substitutes - adverbs.

UNIT IV READING AND LANGUAGE DEVELOPMENT
Reading - comprehension - reading longer texts - reading different types of texts - magazines Writing - letter writing, informal or personal letters - e-mails - conventions of personal email. Listening - listening to dialogues or conversations and completing exercises based on them. Speaking - speaking about oneself - speaking about one’s friend. Language development - Tenses - simple present - simple past - present continuous and past continuous. Vocabulary development - synonyms - antonyms - phrasal verbs.
UNIT V EXTENDED WRITING

Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing- Listening – listening to talks- conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development-collocations-fixed and semi-fixed expressions

TOTAL: 60 PERIODS

OUTCOMES: At the end of the course, learners will be able to:
• Read articles of a general kind in magazines and newspapers.
• Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
• Comprehend conversations and short talks delivered in English
• Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

REFERENCES
5 Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student’s Book& Workbook) Cambridge University Press, New Delhi: 2005
OBJECTIVES:

- The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I  DIFFERENTIAL CALCULUS  
12
Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II  FUNCTIONS OF SEVERAL VARIABLES  
12

UNIT III  INTEGRAL CALCULUS  
12
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV  MULTIPLE INTEGRALS  
12

UNIT V  DIFFERENTIAL EQUATIONS  
12

TOTAL : 60 PERIODS

OUTCOMES:

After completing this course, students should demonstrate competency in the following skills:

- Use both the limit definition and rules of differentiation to differentiate functions.
- Apply differentiation to solve maxima and minima problems.
• Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
• Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
• Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
• Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
• Apply various techniques in solving differential equations.

TEXT BOOKS:
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1.Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES:

PH8151 ENGINEERING PHYSICS

OBJECTIVES:
• To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER
UNIT II WAVES AND FIBER OPTICS


UNIT III THERMAL PHYSICS


UNIT IV QUANTUM PHYSICS


UNIT V CRYSTAL PHYSICS

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

OUTCOMES:

Upon completion of this course,

- the students will gain knowledge on the basics of properties of matter and its applications,
- the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
- the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
- the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunnelling microscopes, and
- the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:


REFERENCES:

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT  I  WATER AND ITS TREATMENT  

UNIT  II  SURFACE CHEMISTRY AND CATALYSIS  

UNIT  III  ALLOYS AND PHASE RULE  

UNIT  IV  FUELS AND COMBUSTION  
UNIT V  ENERGY SOURCES AND STORAGE DEVICES
Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – \( \text{H}_2\text{-O}_2 \) fuel cell.

OUTCOMES:
• The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

REFERENCES:

GE8151  PROBLEM SOLVING AND PYTHON PROGRAMMING  L T P C
3 0 0 3

COURSE OBJECTIVES:
• To know the basics of algorithmic problem solving
• To read and write simple Python programs.
• To develop Python programs with conditionals and loops.
• To define Python functions and call them.
• To use Python data structures — lists, tuples, dictionaries.
• To do input/output with files in Python.

UNIT I  ALGORITHMIC PROBLEM SOLVING
Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II  DATA, EXPRESSIONS, STATEMENTS
Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative
programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS 9
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string values, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES 9
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

COURSE OUTCOMES:
Upon completion of the course, students will be able to
- Develop algorithmic solutions to simple computational problems
- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.

TEXT BOOKS:

REFERENCES:

TOTAL : 45 PERIODS
OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I

PLANE CURVES AND FREEHAND SKETCHING 7+12


UNIT II

PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III

PROJECTION OF SOLIDS 5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV

PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V

ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+12

Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: 90 PERIODS

OUTCOMES:

On successful completion of this course, the student will be able to

- familiarize with the fundamentals and standards of Engineering graphics
• perform freehand sketching of basic geometrical constructions and multiple views of objects.
• project orthographic projections of lines and plane surfaces.
• draw projections and solids and development of surfaces.
• visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LT P C LABORATORY 0 0 4 2

COURSE OBJECTIVES:
• To write, test, and debug simple Python programs.
• To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

**LIST OF PROGRAMS**
1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton’s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

**PLATFORM NEEDED**
Python 3 interpreter for Windows/Linux

**COURSE OUTCOMES:**
Upon completion of the course, students will be able to
- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

**OBJECTIVES:**
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

**LIST OF EXPERIMENTS:**
1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young’s modulus by non-uniform bending method
3. (a) Determination of wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
5. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
6. Determination of wavelength of mercury spectrum – spectrometer grating
7. Determination of band gap of a semiconductor
8. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
• apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:
• To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
• To acquaint the students with the determination of molecular weight of a polymer by viscometry.

1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.
16. Conductometric titration of strong acid vs strong base.

OUTCOMES:
• The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TOTAL: 30 PERIODS

TEXTBOOKS:
OBJECTIVES: The Course prepares second semester engineering and Technology students to:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I | INTRODUCTION TECHNICAL ENGLISH 12
Listening: Listening to talks mostly of a scientific/technical nature and completing information-gap exercises.
Speaking – Asking for and giving directions.
Reading – reading short technical texts from journals, newspapers.
Writing – purpose statements – extended definitions – issue writing instructions – checklists-recommendations.
Vocabulary Development – technical vocabulary.
Language Development – subject verb agreement - compound words.

UNIT II | READING AND STUDY SKILLS 12
Listening: Listening to longer technical talks and completing exercises based on them.
Speaking – describing a process.
Reading – reading longer technical texts - identifying the various transitions in a text.
Writing – interpreting charts, graphs.
Vocabulary Development – vocabulary used in formal letters/emails and reports.
Language Development – impersonal passive voice, numerical adjectives.

UNIT III | TECHNICAL WRITING AND GRAMMAR 12
Listening: Listening to classroom lectures/talks on engineering/technology.
Speaking – introduction to technical presentations.
Reading – longer texts both general and technical, practice in speed reading.
Writing – describing a process, use of sequence words.
Vocabulary Development – sequence words.
Language Development – Misspelled words.

UNIT IV | REPORT WRITING 12
Listening: Listening to documentaries and making notes.
Speaking – mechanics of presentations.
Reading – reading for detailed comprehension.
Vocabulary Development – finding suitable synonyms-paraphrasing.
Language Development – clauses – if conditionals.

UNIT V | GROUP DISCUSSION AND JOB APPLICATIONS 12
Listening: TED/Ink talks; Speaking – participating in a group discussion.
Reading – reading and understanding technical articles.
Writing – Writing reports – minutes of a meeting.
Vocabulary Development – verbal analogies.
Language Development – reported speech.

TOTAL: 60 PERIODS
OUTCOMES: At the end of the course learners will be able to:

- Read technical texts and write area-specific texts effortlessly.
- Listen and comprehend lectures and talks in their area of specialisation successfully.
- Speak appropriately and effectively in varied formal and informal contexts.
- Write reports and winning job applications.

TEXT BOOKS:


REFERENCES


Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251 ENGINEERING MATHEMATICS – II

OBJECTIVES:

- This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I MATRICES


UNIT II VECTOR CALCULUS

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved
UNIT III ANALYTIC FUNCTIONS

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, \frac{1}{z}, z^2 \) - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION


UNIT V LAPLACE TRANSFORMS


TOTAL: 60 PERIODS

OUTCOMES:

After successfully completing the course, the student will have a good understanding of the following topics and their applications:

- Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
- Gradient, divergence and curl of a vector point function and related identities.
- Evaluation of line, surface and volume integrals using Gauss, Stokes and Green’s theorems and their verification.
- Analytic functions, conformal mapping and complex integration.
- Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS:


REFERENCES:

PH8253  PHYSICS FOR ELECTRONICS ENGINEERING  
(LTPE 3 0 0 3)
(Common to BME, ME, CC, ECE, EEE, E&I, ICE)

OBJECTIVES:
- To understand the essential principles of Physics of semiconductor device and Electron transport properties. Become proficient in magnetic, dielectric and optical properties of materials and nano devices.

UNIT I  ELECTRICAL PROPERTIES OF MATERIALS

UNIT II  SEMICONDUCTOR PHYSICS

UNIT III  MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS

UNIT IV  OPTICAL PROPERTIES OF MATERIALS

UNIT V  NANOELECTRONIC DEVICES

TOTAL : 45 PERIODS
OUTCOMES:
At the end of the course, the students will able to
- gain knowledge on classical and quantum electron theories, and energy band structures,
- acquire knowledge on basics of semiconductor physics and its applications in various devices,
- get knowledge on magnetic and dielectric properties of materials,
- have the necessary understanding on the functioning of optical materials for optoelectronics,
- understand the basics of quantum structures and their applications in spintronics and carbon electronics.

TEXT BOOKS:

REFERENCES

BE8252 BASIC CIVIL AND MECHANICAL ENGINEERING
OBJECTIVES:
- To impart basic knowledge on Civil and Mechanical Engineering.
- To familiarize the materials and measurements used in Civil Engineering.
- To provide the exposure on the fundamental elements of civil engineering structures.
- To enable the students to distinguish the components and working principle of power plant units, IC engines, and R & AC system.

A – OVER VIEW

UNIT I SCOPE OF CIVIL AND MECHANICAL ENGINEERING
Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering


B – CIVIL ENGINEERING
UNIT II  SURVEYING AND CIVIL ENGINEERING MATERIALS  10


UNIT III  BUILDING COMPONENTS AND STRUCTURES  15


C – MECHANICAL ENGINEERING

UNIT IV  INTERNAL COMBUSTION ENGINES AND POWER PLANTS  15

Classification of Power Plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Working principle of steam, Gas, Diesel, Hydro - electric and Nuclear Power plants — working principle of Boilers, Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps

UNIT V  REFRIGERATION AND AIR CONDITIONING SYSTEM  10


OUTCOMES:
On successful completion of this course, the student will be able to

• appreciate the Civil and Mechanical Engineering components of Projects.
• explain the usage of construction material and proper selection of construction materials.
• measure distances and area by surveying
• identify the components used in power plant cycle.
• demonstrate working principles of petrol and diesel engine.
• elaborate the components of refrigeration and Air conditioning cycle.

TOTAL: 60 PERIODS

TEXTBOOKS:

REFERENCES:

EE8251 CIRCUIT THEORY

OBJECTIVES:
- To introduce electric circuits and its analysis
- To impart knowledge on solving circuit equations using network theorems
- To introduce the phenomenon of resonance in coupled circuits.
- To educate on obtaining the transient response of circuits.
- To introduce Phasor diagrams and analysis of three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 6+6

UNIT II NETWORK REDUCTION AND THEOREMS FOR DC AND AC IRCUITS 6+6

UNIT III TRANSIENT RESPONSE ANALYSIS 6+6
L and C elements - Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

UNIT IV THREE PHASE CIRCUITS 6+6
A.C. circuits – Average and RMS value - Phasor Diagram – Power, Power Factor and Energy.- Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power measurement in three phase circuits.

UNIT V RESONANCE AND COUPLED CIRCUITS 6+6

TOTAL: 60 PERIODS

OUTCOMES:
- Ability to analyse electrical circuits
- Ability to apply circuit theorems
- Ability to analyse transients

TEXT BOOKS:
GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local
levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests 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, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

TOTAL: 45 PERIODS

OUTCOMES:
- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:
REFERENCES:


GE8261 ENGINEERING PRACTICES LABORATORY

OBJECTIVES:
• To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise:
Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

Welding:
(a) Preparation of butt joints, lap joints and T-joints by Shielded metal arc welding.
(b) Gas welding practice

**Basic Machining:**
(a) Simple Turning and Taper turning
(b) Drilling Practice

**Sheet Metal Work:**
(a) Forming & Bending:
(b) Model making – Trays and funnels.
(c) Different type of joints.

**Machine assembly practice:**
(a) Study of centrifugal pump
(b) Study of air conditioner

**Demonstration on:**
(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and V-fitting models.

**GROUP B (ELECTRICAL & ELECTRONICS)**

**III ELECTRICAL ENGINEERING PRACTICE**
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
5. Measurement of energy using single phase energy meter.

**IV ELECTRONICS ENGINEERING PRACTICE**
1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EX-OR and NOT.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

**TOTAL: 60 PERIODS**

**OUTCOMES:**
On successful completion of this course, the student will be able to
- fabricate carpentry components and pipe connections including plumbing works.
- use welding equipments to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL
1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos
   (b) Demolition Hammer 2 Nos
   (c) Circular Saw 2 Nos
   (d) Planer 2 Nos
   (e) Hand Drilling Machine 2 Nos
   (f) Jigsaw 2 Nos

MECHANICAL
1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
8. Power Tool: Angle Grinder 2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner One each.

ELECTRICAL
1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No.
5. Power Tools: (a) Range Finder 2 Nos
   (b) Digital Live-wire detector 2 Nos

ELECTRONICS
1. Soldering guns 10 Nos.
2. Assorted electronic components for making circuits 50 Nos.
3. Small PCBs 10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply
OBJECTIVES:
- To simulate various electric circuits using Pspice/ Matlab/e-Sim / Scilab
- To gain practical experience on electric circuits and verification of theorems.

LIST OF EXPERIMENTS
1. Simulation and experimental verification of electrical circuit problems using Kirchhoff’s voltage and current laws.
2. Simulation and experimental verification of electrical circuit problems using Thevenin’s theorem.
4. Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5. Simulation and experimental verification of Maximum Power transfer Theorem.
6. Study of Analog and digital oscilloscopes and measurement of sinusoidal voltage, frequency and power factor.
7. Simulation and Experimental validation of R-C electric circuit transients.
8. Simulation and Experimental validation of frequency response of RLC electric circuit.
10. Design and Simulation of parallel resonant circuits.
11. Simulation of three phase balanced and unbalanced star, delta networks circuits.

OUTCOMES:
- Understand and apply circuit theorems and concepts in engineering applications.
- Simulate electric circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

2. Function Generator (1 MHz) - 10 Nos.
4. Oscilloscope (20 MHz) - 10 Nos.
5. Digital Storage Oscilloscope (20 MHz) – 1 No.
6. 10 Nos. of PC with Circuit Simulation Software (min 10 Users) ( e-Sim / Scilab/ Pspice / MATLAB /other Equivalent software Package) and Printer (1 No.)
7. AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.)
9. Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box - 6 Nos each.
10. Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)
MA8353 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS  

OBJECTIVES:

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I  PARTIAL DIFFERENTIAL EQUATIONS  12
Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II  FOURIER SERIES  12

UNIT III  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  12
Classification of PDE – Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV  FOURIER TRANSFORMS  12

UNIT V  Z-TRANSFORMS AND DIFFERENCE EQUATIONS  12

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

- Understand how to solve the given standard partial differential equations.
- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
• Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
• Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXT BOOKS:


REFERENCES:


EE8351 DIGITAL LOGIC CIRCUITS L T P C
2 2 0 3

OBJECTIVES:

• To study various number systems and simplify the logical expressions using Boolean functions
• To study combinational circuits
• To design various synchronous and asynchronous circuits.
• To introduce asynchronous sequential circuits and PLDs
• To introduce digital simulation for development of application oriented logic circuits.

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 6+6
Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code) - Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 6+6
Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, substractors, Encoders and Decoders.
UNIT III  SYNCHRONOUS SEQUENTIAL CIRCUITS  6+6
Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Melay models- Counters, state diagram; state reduction; state assignment.

UNIT IV  ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES  6+6
Asynchronous sequential logic circuits-Transition tability, flow tability-race conditions, hazards & errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA.

UNIT V  VHDL  6+6

TOTAL : 60 PERIODS

OUTCOMES:

- Ability to design combinational and sequential Circuits.
- Ability to simulate using software package.
- Ability to study various number systems and simplify the logical expressions using Boolean functions
- Ability to design various synchronous and asynchronous circuits.
- Ability to introduce asynchronous sequential circuits and PLDs
- Ability to introduce digital simulation for development of application oriented logic circuits.

TEXT BOOKS:

REFERENCES

EE8391  ELECTROMAGNETIC THEORY  L T P C
2 2 0 3

OBJECTIVES:
- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of
  ✓ Electrostatic fields, electrical potential, energy density and their applications.
  ✓ Magneto static fields, magnetic flux density, vector potential and its applications.
Different methods of emf generation and Maxwell’s equations
Electromagnetic waves and characterizing parameters

UNIT I  ELECTROSTATICS – I  6+6
Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields – Gradient, Divergence, Curl – theorems and applications - Coulomb’s Law – Electric field intensity – Field due to discrete and continuous charges – Gauss’s law and applications.

UNIT II  ELECTROSTATICS – II  6+6
Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson’s and Laplace’s equations, Capacitance, Energy density, Applications.

UNIT III  MAGNETOSTATICS  6+6
Lorentz force, magnetic field intensity (H) – Biot–Savart’s Law - Ampere’s Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson’s Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV  ELECTRODYNAMIC FIELDS  6+6

UNIT V  ELECTROMAGNETIC WAVES  6+6
Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.

TOTAL : 60 PERIODS

OUTCOMES:
• Ability to understand the basic mathematical concepts related to electromagnetic vector fields.
• Ability to understand the basic concepts about electrostatic fields, electrical potential, energy density and their applications.
• Ability to acquire the knowledge in magneto static fields, magnetic flux density, vector potential and its applications.
• Ability to understand the different methods of emf generation and Maxwell’s equations
• Ability to understand the basic concepts electromagnetic waves and characterizing parameters
• Ability to understand and compute Electromagnetic fields and apply them for design and analysis of electrical equipment and systems

TEXT BOOKS:
REFERENCES

EE8301
ELECTRICAL MACHINES – I

OBJECTIVES:
To impart knowledge on the following Topics
- Magnetic-circuit analysis and introduce magnetic materials
- Constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
- Working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
- Working principles of DC machines as Generator types, determination of their no-load/load characteristics, starting and methods of speed control of motors.
- Various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

UNIT I
MAGNETIC CIRCUITS AND MAGNETIC MATERIALS 6+6

UNIT II
TRANSFORMERS 6+6

UNIT III
ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTS IN ROTATING MACHINES 6+6
Energy in magnetic system – Field energy and co energy-force and torque equations – singly and multiply excited magnetic field systems-mmf of distributed windings – Winding Inductances-, magnetic fields in rotating machines – rotating mmf waves – magnetic
saturation and leakage fluxes.

UNIT IV  DC GENERATORS  6+6

UNIT V  DC MOTORS  6+6
Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors-starting and speed control of DC motors –Plugging, dynamic and regenerative braking-testing and efficiency – Retardation test- Swinburne’s test and Hopkinson’s test - Permanent Magnet DC (PMDC)motors-applications of DC Motor

OUTCOMES:
- Ability to analyze the magnetic-circuits.
- Ability to acquire the knowledge in constructional details of transformers.
- Ability to understand the concepts of electromechanical energy conversion.
- Ability to acquire the knowledge in working principles of DC Generator.
- Ability to acquire the knowledge in working principles of DC Motor
- Ability to acquire the knowledge in various losses taking place in D.C. Machines

TEXT BOOKS:

REFERENCES
EC8353 ELECTRON DEVICES AND CIRCUITS

OBJECTIVES:

The student should be made to:

- Understand the structure of basic electronic devices.
- Be exposed to active and passive circuit elements.
- Familiarize the operation and applications of transistor like BJT and FET.
- Explore the characteristics of amplifier gain and frequency response.
- Learn the required functionality of positive and negative feedback systems.

UNIT I PN JUNCTION DEVICES

PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance - Rectifiers – Half Wave and Full Wave Rectifier,– Display devices- LED, Laser diodes, Zener diode characteristics- Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS AND THYRISTORS

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.

UNIT III AMPLIFIERS

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response –MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS


TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Explain the structure and working operation of basic electronic devices.
- Able to identify and differentiate both active and passive elements
- Analyze the characteristics of different electronic devices such as diodes and transistors
- Choose and adapt the required components to construct an amplifier circuit.
- Employ the acquired knowledge in design and analysis of oscillators

TEXT BOOKS:

REFERENCES:

ME8792 POWER PLANT ENGINEERING L T P C
3 0 0 3

OBJECTIVE:
- Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.

UNIT I COAL BASED THERMAL POWER PLANTS 9

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

UNIT III NUCLEAR POWER PLANTS 9

UNIT IV POWER FROM RENEWABLE ENERGY 9
Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9
Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.
OUTCOMES:
Upon the completion of this course the students will be able to
CO1 Explain the layout, construction and working of the components inside a thermal power plant.
CO2 Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.
CO3 Explain the layout, construction and working of the components inside nuclear power plants.
CO4 Explain the layout, construction and working of the components inside Renewable energy power plants.
CO5 Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

TEXT BOOK:

REFERENCES:

EC8311 ELECTRONICS LABORATORY

OBJECTIVES:
- To enableity the students to understand the behavior of semiconductor device based on experimentation.

LIST OF EXPERIMENTS
1. Characteristics of Semiconductor diode and Zener diode
2. Characteristics of a NPN Transistor under common emitter, common collector and common base configurations
3. Characteristics of JFET and draw the equivalent circuit
4. Characteristics of UJT and generation of saw tooth waveforms
5. Design and Frequency response characteristics of a Common Emitter amplifier
6. Characteristics of photo diode & photo transistor, Study of light activated relay circuit
7. Design and testing of RC phase shift and LC oscillators
8. Single Phase half-wave and full wave rectifiers with inductive and capacitive filters
9. Differential amplifiers using FET
10. Study of CRO for frequency and phase measurements
11. Realization of passive filters

TOTAL: 60 PERIODS

OUTCOMES:
- Ability to understand and analyse electronic circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Semiconductor devices like Diode, Zener Diode, NPN Transistors, JFET, UJT, Photo diode, Photo Transistor
2. Resistors, Capacitors and inductors
3. Necessary digital IC
4. Function Generators
5. Regulated 3 output Power Supply 5, ± 15V
6. CRO
7. Storage Oscilloscope
8. Bread boards
9. Atleast one demo module each for the listed equipments.
10. Component data sheets to be provided

EE8311 ELECTRICAL MACHINES LABORATORY-I

OBJECTIVES:
- To expose the students to the operation of D.C. machines and transformers and give them experimental skill.

LIST OF EXPERIMENTS
1. Open circuit and load characteristics of DC shunt generator- critical resistance and critical speed.
2. Load characteristics of DC compound generator with differential and cumulative connections.
3. Load test on DC shunt motor.
4. Load test on DC compound motor.
5. Load test on DC series motor.
6. Swinburne’s test and speed control of DC shunt motor.
8. Load test on single-phase transformer and three phase transformers.
9. Open circuit and short circuit tests on single phase transformer.
10. Sumpner’s test on single phase transformers.
12. Study of starters and 3-phase transformers connections.

TOTAL: 60 PERIODS

OUTCOMES:
- Ability to understand and analyze DC Generator
• Ability to understand and analyze DC Motor
• Ability to understand and analyze Transformers.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. DC Shunt Motor with Loading Arrangement – 3 nos
2. DC Shunt Motor Coupled with Three phase Alternator – 1 No.
3. Single Phase Transformer – 4 nos
4. DC Series Motor with Loading Arrangement – 1 No.
5. DC compound Motor with Loading Arrangement – 1 No.
6. Three Phase Induction Motor with Loading Arrangement – 2 nos
7. Single Phase Induction Motor with Loading Arrangement – 1 No.
8. DC Shunt Motor Coupled With DC Compound Generator – 2 nos
9. DC Shunt Motor Coupled With DC Shunt Motor – 1 No.
10. Tachometer -Digital/Analog – 8 nos
11. Single Phase Auto Transformer – 2 nos
12. Three Phase Auto Transformer – 1 No.
13. Single Phase Resistive Loading Bank – 2 nos
14. Three Phase Resistive Loading Bank. – 2 nos

MA8491  NUMERICAL METHODS
L    T    P    C
4    0    0     4

OBJECTIVES :
• To introduce the basic concepts of solving algebraic and transcendental equations.
• To introduce the numerical techniques of interpolation in various intervals in real life situations.
• To acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
• To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.
• To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT I  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS
12
UNIT II  INTERPOLATION AND APPROXIMATION  12
Interpolation with unequal intervals - Lagrange's interpolation – Newton’s divided difference interpolation – Cubic Splines - Difference operators and relations - Interpolation with equal intervals - Newton’s forward and backward difference formulae.

UNIT III  NUMERICAL DIFFERENTIATION AND INTEGRATION  12

UNIT IV  INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  12

UNIT V  BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  12
Finite difference methods for solving second order two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

TOTAL :  60 PERIODS

OUTCOMES :
Upon successful completion of the course, students should be able to:
• Understand the basic concepts and techniques of solving algebraic and transcendental equations.
• Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.
• Apply the numerical techniques of differentiation and integration for engineering problems.
• Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
• Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXTBOOKS :

REFERENCES :
OBJECTIVES:
To impart knowledge on the following Topics
- Construction and performance of salient and non-salient type synchronous generators.
- Principle of operation and performance of synchronous motor.
- Construction, principle of operation and performance of induction machines.
- Starting and speed control of three-phase induction motors.
- Construction, principle of operation and performance of single phase induction motors and special machines.

UNIT I  SYNCHRONOUS GENERATOR  6+6

UNIT II  SYNCHRONOUS MOTOR  6+6
Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed-Hunting – natural frequency of oscillations – damper windings- synchronous condenser.

UNIT III  THREE PHASE INDUCTION MOTOR  6+6

UNIT IV  STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR  6+6

UNIT V  SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES  6+6

TOTAL :  60 PERIODS
OUTCOMES:
- Ability to understand the construction and working principle of Synchronous Generator.
- Ability to understand MMF curves and armature windings.
- Ability to acquire knowledge on Synchronous motor.
- Ability to understand the construction and working principle of Three phase Induction Motor.
- Ability to understand the construction and working principle of Special Machines.
- Ability to predetermine the performance characteristics of Synchronous Machines.

TEXT BOOKS:

REFERENCES

EE8402 TRANSMISSION AND DISTRIBUTION

OBJECTIVES:
- To study the structure of electric power system and to develop expressions for the computation of transmission line parameters.
- To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.
- To study the types, construction of capabilities and methods to improve the efficiency.
- To study about distribution systems, types of substations, methods of grounding, EHVAC, HVDC and FACTS.

UNIT I TRANSMISSION LINE PARAMETERS
Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects -Typical configurations, conductor types and electrical parameters of EHV lines.
UNIT II MODELLING AND PERFORMANCE OF TRANSMISSION LINES

Performance of Transmission lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines - Power Circle diagrams - Formation of Corona – Critical Voltages – Effect on Line Performance.

UNIT III MECHANICAL DESIGN OF LINES

Mechanical design of OH lines – Line Supports –Types of towers – Stress and Sag Calculation – Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT IV UNDERGROUND CABLES


UNIT V DISTRIBUTION SYSTEMS


TOTAL : 45 PERIODS

OUTCOMES:

- To understand the importance and the functioning of transmission line parameters.
- To understand the concepts of Lines and Insulators.
- To acquire knowledge on the performance of Transmission lines.
- To understand the importance of distribution of the electric power in power system.
- To acquire knowledge on Underground Cabilities
- To become familiar with the function of different components used in Transmission and Distribution levels of power system and modelling of these components.

TEXT BOOKS:


REFERENCES

3. Arun Ingole, "power transmission and distribution" Pearson Education, 2017

EE8403 MEASUREMENTS AND INSTRUMENTATION L T P C
3 0 0 3

OBJECTIVES:
To impart knowledge on the following Topics
- Basic functional elements of instrumentation
- Fundamentals of electrical and electronic instruments
- Comparison between various measurement techniques
- Various storage and display devices
- Various transducers and the data acquisition systems

UNIT I INTRODUCTION
Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration-Principle and types of analog and digital voltmeters, ammeters.

UNIT II ELECTRICAL AND ELECTRONIC INSTRUMENTS

UNIT III COMPARATIVE METHODS OF MEASUREMENTS
D.C potentiometers, D.C (Wheat stone, Kelvin and Kelvin Double bridge) & A.C bridges (Maxwell, Anderson and Schering bridges), transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic Interference – Grounding techniques.

UNIT IV STORAGE AND DISPLAY DEVICES
Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & Dot matrix display – Data Loggers.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS

TOTAL: 45 PERIODS

OUTCOMES:
- To acquire knowledge on Basic functional elements of instrumentation
- To understand the concepts of Fundamentals of electrical and electronic instruments
- Ability to compare between various measurement techniques
- To acquire knowledge on Various storage and display devices
- To understand the concepts Various transducers and the data acquisition systems
- Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.
TEXT BOOKS:

REFERENCES

EE8451 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS  L  T  P  C
3  0  0  3

OBJECTIVES:
To impart knowledge on the following topics
• Signal analysis using Op-amp based circuits.
• Applications of Op-amp.
• Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.
• IC fabrication procedure.

UNIT I IC FABRICATION
IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II CHARACTERISTICS OF OPAMP
Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers, summer, differentiator and integrator-V/I & I/V converters.

UNIT III APPLICATIONS OF OPAMP
Instrumentation amplifier and its applications for transducer Bridge, Log and Antilog Amplifiers- Analog multiplier & Divider, first and second order active filters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit—D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

UNIT IV SPECIAL ICs
Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltage controlled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs.
UNIT V APPLICATION ICs

AD623 Instrumentation Amplifier and its application as load cell weight measurement - IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variability voltage regulators, switching regulator- SMPS - ICL 8038 function generator IC.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to acquire knowledge in IC fabrication procedure
- Ability to analyze the characteristics of Op-Amp
- To understand the importance of Signal analysis using Op-amp based circuits.
- Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.
- To understand and acquire knowledge on the Applications of Op-amp
- Ability to understand and analyse, linear integrated circuits their Fabrication and Application.

TEXT BOOKS:

REFERENCES

IC8451 CONTROL SYSTEMS

COURSE OBJECTIVES
- To understand the use of transfer function models for analysis physical systems and introduce the control system components.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To introduce stability analysis and design of compensators.
To introduce state variable representation of physical systems

UNIT I  SYSTEMS AND REPRESENTATION  9

UNIT II  TIME RESPONSE  9

UNIT III  FREQUENCY RESPONSE  9
Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications

UNIT IV  STABILITY AND COMPENSATOR DESIGN  9
Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria – Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag-lead compensator using bode plots.

UNIT V  STATE VARIABLE ANALYSIS  9
Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability.

TOTAL (L: 45+T:30): 75 PERIODS

COURSE OUTCOMES
At the end of the course, the student should have the:

- Ability to develop various representations of system based on the knowledge of Mathematics, Science and Engineering fundamentals.
- Ability to do time domain and frequency domain analysis of various models of linear system.
- Ability to interpret characteristics of the system to develop mathematical model.
- Ability to design appropriate compensator for the given specifications.
- Ability to come out with solution for complex control problem.
- Ability to understand use of PID controller in closed loop system.

TEXT BOOKS

REFERENCES
OBJECTIVES:
- To expose the students to the operation of synchronous machines and induction motors and give them experimental skill.

LIST OF EXPERIMENTS
1. Regulation of three phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Measurements of negative sequence and zero sequence impedance of alternators.
5. V and Inverted V curves of Three Phase Synchronous Motor.
7. No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters).
10. No load and blocked rotor test on single-phase induction motor.
11. Study of Induction motor Starters

TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course, the student should have the:
- Ability to understand and analyze EMF and MMF methods
- Ability to analyze the characteristics of V and Inverted V curves
- Ability to understand the importance of Synchronous machines
- Ability to understand the importance of Induction Machines
- Ability to acquire knowledge on separation of losses

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Synchronous Induction motor 3HP – 1 No.
2. DC Shunt Motor Coupled With Three phase Alternator – 4 nos
3. DC Shunt Motor Coupled With Three phase Slip ring Induction motor – 1 No.
4. Three Phase Induction Motor with Loading Arrangement – 2 nos
5. Single Phase Induction Motor with Loading Arrangement – 2 nos
6. Tachometer -Digital/Analog – 8 nos
7. Single Phase Auto Transformer – 2 nos
8. Three Phase Auto Transformer – 3 nos
9. Single Phase Resistive Loading Bank – 2 nos
10. Three Phase Resistive Loading Bank – 2 nos
EE8461  LINEAR AND DIGITAL INTEGRATED CIRCUITS
LABORATORY

OBJECTIVES:
- To learn design, testing and characterizing of circuit behavior with digital and analog ICs.

LIST OF EXPERIMENTS
1. Implementation of Boolean Functions, Adder and Subtractor circuits.
2. Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa
3. Parity generator and parity checking
4. Encoders and Decoders
5. Counters: Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types using FF IC’s and specific counter IC.
6. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC’s.
7. Study of multiplexer and de multiplexer
8. Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.
10. Voltage to frequency characteristics of NE/SE 566 IC.

TOTAL: 60 PERIODS

OUTCOMES:
At the end of the course, the student should have the:
- Ability to understand and implement Boolean Functions.
- Ability to understand the importance of code conversion
- Ability to Design and implement 4-bit shift registers
- Ability to acquire knowledge on Application of Op-Amp
- Ability to Design and implement counters using specific counter IC.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: (3 per Batch)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the equipments / Components</th>
<th>Quantity Required</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dual ,(0-30V) variability Power Supply</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>CRO</td>
<td>9</td>
<td>30MHz</td>
</tr>
<tr>
<td>3</td>
<td>Digital Multimeter</td>
<td>10</td>
<td>Digital</td>
</tr>
<tr>
<td>4</td>
<td>Function Generator</td>
<td>8</td>
<td>1 MHz</td>
</tr>
<tr>
<td>5</td>
<td>IC Tester (Analog)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bread board</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consumability (sufficient quantity)</td>
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<td>1</td>
<td>IC 741/ IC NE555/566/565</td>
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<td>6</td>
<td>ICSG3524 / SG3525</td>
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<td>7</td>
<td>Transistor – 2N3391</td>
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<tr>
<td>8</td>
<td>Diodes, IN4001, BY126</td>
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<td>9</td>
<td>Zener diodes</td>
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<tr>
<td>10</td>
<td>Potentiometer</td>
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<td>11</td>
<td>Step-down transformer 230V/12-0-12V</td>
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<td>12</td>
<td>Capacitor</td>
<td></td>
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<td>13</td>
<td>Resistors 1/4 Watt Assorted</td>
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<tr>
<td>14</td>
<td>Single Strand Wire</td>
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</table>

**EE8412 TECHNICAL SEMINAR LT P C 0 0 2 1**

**OBJECTIVES:**
- To encourage the students to study advanced engineering developments
- To prepare and present technical reports.
- To encourage the students to use various teaching aids such as overhead projectors, power point presentation and demonstrative models.

**METHOD OF EVALUATION:**

During the seminar session each student is expected to prepare and present a topic on engineering/technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he/she can submit a report on his/her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.

**TOTAL: 30 PERIODS**
OUTCOMES:
- Ability to review, prepare and present technological developments
- Ability to face the placement interviews

EE8501 POWER SYSTEM ANALYSIS

OBJECTIVES:
- To model the power system under steady state operating condition
- To understand and apply iterative techniques for power flow analysis
- To model and carry out short circuit studies on power system
- To model and analyze stability problems in power system

UNIT I POWER SYSTEM
Need for system planning and operational studies - Power scenario in India - Power system components – Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram - Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix from primitive parameters - Representation of off-nominal transformer - Formation of bus admittance matrix of large power network.

UNIT II POWER FLOW ANALYSIS

UNIT III SYMMETRICAL FAULT ANALYSIS
Assumptions in short circuit analysis - Symmetrical short circuit analysis using Thevenin’s theorem - Bus Impedance matrix building algorithm (without mutual coupling) - Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level - Current limiting reactors.

UNIT IV UNSYMMETRICAL FAULT ANALYSIS
Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurring at any point in a power system - computation of post fault currents in symmetrical component and phasor domains.

UNIT V STABILITY ANALYSIS

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to model the power system under steady state operating condition
- Ability to understand and apply iterative techniques for power flow analysis
- Ability to model and carry out short circuit studies on power system
- Ability to model and analyze stability problems in power system
• Ability to acquire knowledge on Fault analysis.
• Ability to model and understand various power system components and carry out power flow, short circuit and stability studies.

TEXT BOOKS:

REFERENCES

EE8551 MICROPROCESSORS AND MICROCONTROLLERS  

OBJECTIVES:
To impart knowledge on the following Topics
• Architecture of µP8085 & µC 8051
• Addressing modes & instruction set of 8085 & 8051.
• Need & use of Interrupt structure 8085 & 8051.
• Simple applications development with programming 8085 & 8051

UNIT I 8085 PROCESSOR

UNIT II PROGRAMMING OF 8085 PROCESSOR
Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions – Programming: Loop structure with counting & Indexing – Look up tability - Subroutine instructions - stack.

UNIT III 8051 MICRO CONTROLLER
UNIT IV  
PERIPHERAL INTERFACING  
9
Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279, - A/D and D/A converters & Interfacing with 8085 & 8051.

UNIT V  
MICRO CONTROLLER PROGRAMMING & APPLICATIONS  
9
Simple programming exercises - key board and display interface – Control of servo motor- stepper motor control - Application to automation systems.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051.
- Ability to need & use of Interrupt structure 8085 & 8051.
- Ability to understand the importance of Interfacing
- Ability to explain the architecture of Microprocessor and Microcontroller.
- Ability to write the assembly language programme.
- Ability to develop the Microprocessor and Microcontroller based applications.

TEXT BOOKS:

REFERENCES

EE8552  
POWER ELECTRONICS  
L T P C
3 0 0 3

OBJECTIVES:
To impart knowledge on the following Topics
- Different types of power semiconductor devices and their switching
- Operation, characteristics and performance parameters of controlled rectifiers
- Operation, switching techniques and basics topologies of DC-DC switching regulators.
- Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
- Operation of AC voltage controller and various configurations.
UNIT I  POWER SEMI-CONDUCTOR DEVICES  
Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits.

UNIT II  PHASE-CONTROLLED CONVERTERS  
2-pulse, 3-pulse and 6-pulseconverters— performance parameters —Effect of source inductance— Firing Schemes for converter—Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

UNIT III  DC TO DC CONVERTERS  

UNIT IV  INVERTERS  
Single phase and three phase voltage source inverters (both120° mode and 180° mode)— Voltage& harmonic control—PWM techniques: Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM – Introduction to space vector modulation –Current source inverter, Applications-Induction heating, UPS.

UNIT V  AC TO AC CONVERTERS  
Single phase and Three phase AC voltage controllers—Control strategy- Power Factor Control – Multistage sequence control -single phase and three phase cyclo converters – Introduction to Matrix converters, Applications –welding .

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to analyse AC-AC and DC-DC and DC-AC converters.
- Ability to choose the converters for real time applications.

TEXT BOOKS:

REFERENCES
OBJECTIVES: To impart knowledge about the following topics:
- Signals and systems & their mathematical representation.
- Discrete time systems.
- Transformation techniques & their computation.
- Filters and their design for digital implementation.
- Programmability digital signal processor & quantization effects.

UNIT I INTRODUCTION 6+6
Classification of systems: Continuous, discrete, linear, causal, stability, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 6+6
Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Discrete Time Fourier transform, magnitude and phase representation.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 6+6

UNIT IV DESIGN OF DIGITAL FILTERS 6+6
FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. Analog filter design – Butterworth and Chebyshev approximations; IIR Filters, digital design using impulse invariant and bilinear transformation Warping, pre warping.

UNIT V DIGITAL SIGNAL PROCESSORS 6+6

OUTCOMES:
1. Ability to understand the importance of Fourier transform, digital filters and DS Processors.
2. Ability to acquire knowledge on Signals and systems & their mathematical representation.
3. Ability to understand and analyze the discrete time systems.
4. Ability to analyze the transformation techniques & their computation.
5. Ability to understand the types of filters and their design for digital implementation.
6. Ability to acquire knowledge on programmability digital signal processor & quantization effects.

TEXT BOOKS:

REFERENCES

CS8392 OBJECT ORIENTED PROGRAMMING

OBJECTIVES:
• To understand Object Oriented Programming concepts and basic characteristics of Java
• To know the principles of packages, inheritance and interfaces
• To define exceptions and use I/O streams
• To develop a java application with threads and generics classes
• To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS

UNIT II INHERITANCE AND INTERFACES
Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O
Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING
Differences between multi-threading and multitasking, thread life cycle, creating threads,
synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT V          EVENT DRIVEN PROGRAMMING  9

COURSE OUTCOMES:
Upon completion of the course, students will be able to:
- Develop Java programs using OOP principles
- Develop Java programs with the concepts inheritance and interfaces
- Build Java applications using exceptions and I/O streams
- Develop Java applications with threads and generics classes
- Develop interactive Java programs using swings

TEXT BOOKS

REFERENCES

EE8511          CONTROL AND INSTRUMENTATION LABORATORY  L  T  P  C
                                           0  0  4  2

OBJECTIVES:
- To provide knowledge on analysis and design of control system along with basics of instrumentation.

LIST OF EXPERIMENTS
CONTROLSYSTEMS:
1. P, PI and PID controllers
2. Stability Analysis
4. Design of Lag, Lead and Lag-Lead Compensators
5. Position Control Systems
6. Synchro-Transmitter- Receiver and Characteristics
7. Simulation of Control Systems by Mathematical development tools.
INSTRUMENTATION:
8. Bridge Networks – AC and DC Bridges
9. Dynamics of Sensors/Transducers
   (a) Temperature (b) pressure (c) Displacement (d) Optical (e) Strain (f) Flow
10 Power and Energy Measurement
11 Signal Conditioning
   (a) Instrumentation Amplifier
   (b) Analog – Digital and Digital – Analog converters (ADC and DACs)
12 Process Simulation

TOTAL: 60 PERIODS

OUTCOMES:
• Ability to understand control theory and apply them to electrical engineering problems.
• Ability to analyze the various types of converters.
• Ability to design compensators
• Ability to understand the basic concepts of bridge networks.
• Ability to the basics of signal conditioning circuits.
• Ability to study the simulation packages.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CONTROLSYSTEMS:
1. PID controller simulation and learner kit – 1 No.
2. Digital storage Oscilloscope for capturing transience- 1 No
   2 Personal Computer with control
   system simulation packages - 10 Nos
3. DC motor – Generator test set-up for evaluation of motor parameters
4. CRO 30MHz – 1 No.
5. 2MHz Function Generator – 1 No.
6. Position Control Systems Kit (with manual) – 1 No., Tacho Generator Coupling set
7. AC Synchro transmitter& receiver – 1 No.
8. Sufficient number of Digital multi meters, speed and torque sensors

INSTRUMENTATION:
9. R, L, C Bridge kit (with manual)
10. a) Electric heater – 1 No.
    Thermometer – 1 No. Thermistor (silicon type) RTD nickel type – 1 No.
    b) 30 psi Pressure chamber (complete set) – 1 No. Current generator (0 – 20mA) Air
        foot pump – 1 No. (with necessary connecting tubes)
    c) LVDT 20mm core length movability type – 1 No. CRO 30MHz – 1 No.
    d) Optical sensor – 1 No. Light source
    e) Strain Gauge Kit with Handy lever beam – 1 No.
100gm weights – 10 nos
f) Flow measurement Trainer kit – 1 No.
   (1/2 HP Motor, Water tank, Digital Milliammeter, complete set)
11. Single phase Auto transformer – 1 No. Watt-hour meter (energy meter) – 1 No. Ammeter
    Voltmeter Rheostat Stop watch
    Connecting wires (3/20)
12. IC Transistor kit – 1 No.
13. Instrumentation Amplifier kit-1 No
14. Analog – Digital and Digital – Analog converters (ADC and DACs)- 1 No

HS8581

PROFESSIONAL COMMUNICATION

OBJECTIVES: The course aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employability Graduates
- Develop their confidence and help them attend interviews successfully.

UNIT I
Introduction to Soft Skills—Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II
Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III
Introduction to Group Discussion—Participating in group discussions – understanding group dynamics - brainstorming the topic — questioning and clarifying – GD strategies- activities to improve GD skills

UNIT IV
Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview & panel interview – FAQs related to job interviews

UNIT V
Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes.

TOTAL : 30 PERIODS

OUTCOMES: At the end of the course Learners will be ability to:

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

**Recommended Software**

1. Globearena
2. Win English

**REFERENCES:**

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**CS8383 OBJECT ORIENTED PROGRAMMING**

**LABORATORY**

**COURSE OBJECTIVES**
- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
- To develop applications using generic programming and event handling.

**List of experiments**
1. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e. domestic or commercial). Compute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows:
   - First 100 units - Rs. 1 per unit
   - 101-200 units - Rs. 2.50 per unit
   - 201-500 units - Rs. 4 per unit
   - > 501 units - Rs. 6 per unit

   If the type of the EB connection is commercial, calculate the amount to be paid as follows:
   - First 100 units - Rs. 2 per unit
   - 101-200 units - Rs. 4.50 per unit
   - 201-500 units - Rs. 6 per unit
   - > 501 units - Rs. 7 per unit

2. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.

3. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the
inherited classes with 97% of BP as DA, 10% of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.

5. Write a program to perform string operations using ArrayList. Write functions for the following:
   a. Append - add at end
   b. Insert – add at particular index
   c. Search
   d. List all string starts with given letter

6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

7. Write a Java program to implement user defined exception handling.

8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

10. Write a java program to find the maximum value from the given type of elements using a generic function.

11. Design a calculator using event-driven programming paradigm of Java with the following options.
   a) Decimal manipulations
   b) Scientific manipulations

12. Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

COURSE OUTCOMES

Upon completion of the course, the students will be able to

- Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
- Develop and implement Java programs with arraylist, exception handling and multithreading.
- Design applications using file processing, generic programming and event handling.
OBJECTIVES:
To impart knowledge on the following Topics

- Steady state operation and transient dynamics of a motor load system.
- Analyze the operation of the converter/chopper fed dc drive, both qualitatively and quantitatively.
- Operation and performance of AC motor drives.
- Analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

UNIT I  DRIVE CHARACTERISTICS

UNIT II  CONVERTER / CHOPPER FED DC MOTOR DRIVE

UNIT III  INDUCTION MOTOR DRIVES

UNIT IV  SYNCHRONOUS MOTOR DRIVES
V/f control and self-control of synchronous motor: Margin angle control and power factor control- Three phase voltage/current source fed synchronous motor- Applications.

UNIT V  DESIGN OF CONTROLLERS FOR DRIVES
Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback–armature voltage control and field weakening mode – Design of controllers; current controller and speed controller- converter selection and characteristics.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand and suggest a converter for solid state drive.
- Ability to select suitability drive for the given application.
- Ability to study about the steady state operation and transient dynamics of a motor load system.
- Ability to analyze the operation of the converter/chopper fed dc drive.
- Ability to analyze the operation and performance of AC motor drives.
- Ability to analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

TEXT BOOKS:

REFERENCES

EE8602 PROTECTION AND SWITCHGEAR L T P C
3 0 0 3

OBJECTIVES:
To impart knowledge on the following Topics
- Causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- Characteristics and functions of relays and protection schemes.
- Apparatus protection, static and numerical relays
- Functioning of circuit breaker

UNIT I PROTECTION SCHEMES
Principles and need for protective schemes – nature and causes of faults – types of faults – Methods of Grounding - Zones of protection and essential qualities of protection – Protection scheme

UNIT II ELECTROMAGNETIC RELAYS
Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Over current, Directional, Distance, Differential, Negative sequence and Under frequency relays.

UNIT III APPARATUS PROTECTION
Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, bus bars and transmission line.

UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION
Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators – Block diagram of Numerical relays – Over current protection, transformer differential protection, distant protection of transmission lines.

UNIT V CIRCUIT BREAKERS
Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping - interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF6, MCBs, MCCBs and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand and analyze Electromagnetic and Static Relays.
- Ability to suggest suitability circuit breaker.
- Ability to find the causes of abnormal operating conditions of the apparatus and system.
• Ability to analyze the characteristics and functions of relays and protection schemes.
• Ability to study about the apparatus protection, static and numerical relays.
• Ability to acquire knowledge on functioning of circuit breaker.

TEXT BOOKS:

REFERENCES

EE8691 EMBEDDED SYSTEMS L T P C
3 0 0 3

OBJECTIVES:
To impart knowledge on the following Topics
• Building Blocks of Embedded System
• Various Embedded Development Strategies
• Bus Communication in processors, Input/output interfacing.
• Various processor scheduling algorithms.
• Basics of Real time operating system and example tutorials to discuss on one real time operating system tool.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS

UNIT II EMBEDDED NETWORKING

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT
Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model,
Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN
Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes- semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT V EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT
Case Study of Washing Machine- Automotive Application- Smart card System Application- ATM machine –Digital camera

OUTCOMES:
• Ability to understand and analyze Embedded systems.
• Ability to suggest an embedded system for a given application.
• Ability to operate various Embedded Development Strategies
• Ability to study about the bus Communication in processors.
• Ability to acquire knowledge on various processor scheduling algorithms.
• Ability to understand basics of Real time operating system.

TEXT BOOKS:

REFERENCES

EE8661 POWER ELECTRONICS AND DRIVES LABORATORY

OBJECTIVES:
• To provide hands on experience with power electronic converters and testing.

LIST OF EXPERIMENTS
1. Gate Pulse Generation using R, RC and UJT.
2. Characteristics of SCR and TRIAC
3. Characteristics of MOSFET and IGBT
4. AC to DC half controlled converter
5. AC to DC fully controlled Converter
6. Step down and step up MOSFET based choppers
7. IGBT based single phase PWM inverter
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Device characteristics(for SCR, MOSFET, TRIAC,GTO,IGCT and IGBT kit with built-in / discrete power supply and meters) - 2 each
2. SinglephaseSCRbasedhalfcontrolledconverterandfullycontrolledconverteralong with built-in/separate/firing circuit/module and meter – 2 each
3. MOSFET based step up and step down choppers (Built in/ Discrete) – 1 each
4. IGBT based single phase PWM inverter module/Discrete Component – 2
5. IGBT based three phase PWM inverter module/Discrete Component – 2
6. Switched mode power converter module/Discrete Component – 2
7. SCR &TRIAC based 1 phase AC controller along with lamp or rheostat load - 2
8. Cyclo converter kit with firing module – 1
9. Dual regulated DC power supply with common ground
10. Cathode ray Oscilloscope – 10
11. Isolation Transformer – 5
12. Single phase Auto transformer – 3
13. Components (Inductance, Capacitance ) 3 set for each
14. Multimeter – 5
15. LCR meter – 3
16. Rheostats of various ranges – 2 sets of 10 value
17. Work tabilities – 10
18. DC and AC meters of required ranges – 20
19. Component data sheets to be provided

TOTAL: 60 PERIODS

OUTCOMES:
- Ability to practice and understand converter and inverter circuits and apply software for engineering problems.
- Ability to experiment about switching characteristics various switches.
- Ability to analyze about AC to DC converter circuits.
- Ability to analyze about DC to AC circuits.
- Ability to acquire knowledge on AC to AC converters
- Ability to acquire knowledge on simulation software.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
OBJECTIVES:
- To provide training on programming of microprocessors and microcontrollers and understand the interface requirements.
- To simulate various microprocessors and microcontrollers using KEIL or Equivalent simulator.

LIST OF EXPERIMENTS
1. Simple arithmetic operations: addition / subtraction / multiplication / division.
2. Programming with control instructions:
   (i) Ascending / Descending order, Maximum / Minimum of numbers.
   (ii) Programs using Rotate instructions.
   (iii) Hex / ASCII / BCD code conversions.
3. Interface Experiments: with 8085
   (i) A/D Interfacing & D/A Interfacing.
4. Traffic light controller.
5. I/O Port / Serial communication
6. Programming Practices with Simulators/Emulators/open source
7. Read a key, interface display
8. Demonstration of basic instructions with 8051 Micro controller execution, including:
   (i) Conditional jumps & looping
   (ii) Calling subroutines.
9. Programming I/O Port and timer of 8051
   (i) Study on interface with A/D & D/A
   (ii) Study on interface with DC & AC motors
10. Application hardware development using embedded processors.

TOTAL: 60 PERIODS

OUTCOMES:
- Ability to understand and apply computing platform and software for engineering problems.
- Ability to programming logics for code conversion.
- Ability to acquire knowledge on A/D and D/A.
- Ability to understand basics of serial communication.
- Ability to understand and impart knowledge in DC and AC motor interfacing.
- Ability to understand basics of software simulators.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8085 Microprocessor Trainer with Power Supply</td>
<td>15</td>
</tr>
<tr>
<td>2.</td>
<td>8051 Micro Controller Trainer Kit with power supply</td>
<td>15</td>
</tr>
<tr>
<td>3.</td>
<td>8255 Interface boards</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>8251 Interface boards</td>
<td>5</td>
</tr>
</tbody>
</table>
EE8611 MINI PROJECT 

OBJECTIVES:
• To develop their own innovative prototype of ideas.
• To train the students in preparing mini project reports and examination.

The students in a group of 5 to 6 works on a topic approved by the head of the department and prepares a comprehensive mini project report after completing the work to the satisfaction. The progress of the project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department. A mini project report is required at the end of the semester. The mini project work is evaluated based on oral presentation and the mini project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 60 PERIODS

OUTCOMES:
• On Completion of the mini project work students will be in a position to take up their final year project work and find solution by formulating proper methodology.

EE8701 HIGH VOLTAGE ENGINEERING

OBJECTIVES:
To impart knowledge on the following Topics
• Various types of over voltages in power system and protection methods.
• Generation of over voltages in laboratories.
• Measurement of over voltages.
• Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics.
• Testing of power apparatus and insulation coordination

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS
Causes of over voltages and its effects on power system – Lightning, switching surges and temporary over voltages, Corona and its effects – Bewley lattice diagram- Protection against over voltages.
UNIT II DIELECTRIC BREAKDOWN 9

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9

UNIT V HIGH VOLTAGE TESTING & INSULATION COORDINATION 9
High voltage testing of electrical power apparatus as per International and Indian standards – Power frequency, impulse voltage and DC testing of Insulators, circuit breakers, bushing, isolators and transformers- Insulation Coordination& testing of cabilitys.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand Transients in power system.
- Ability to understand Generation and measurement of high voltage.
- Ability to understand High voltage testing.
- Ability to understand various types of over voltages in power system.
- Ability to measure over voltages.
- Ability to test power apparatus and insulation coordination

TEXT BOOKS:

REFERENCES
OBJECTIVES:
To impart knowledge on the following topics
- Significance of power system operation and control.
- Real power-frequency interaction and design of power-frequency controller.
- Reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
- Economic operation of power system.
- SCADA and its application for real time operation and control of power systems

UNIT I  PRELIMINARIES ON POWER SYSTEM OPERATION AND CONTROL
Power scenario in Indian grid – National and Regional load dispatching centers – requirements of good power system - necessity of voltage and frequency regulation - real power vs frequency and reactive power vs voltage control loops - system load variation, load curves and basic concepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generators in parallel.

UNIT II  REAL POWER - FREQUENCY CONTROL
Load Frequency Control (LFC) of single area system-static and dynamic analysis of uncontrolled and controlled cases - LFC of two area system - tie line modeling - block diagram representation of two area system - static and dynamic analysis - tie line with frequency bias control – state variability model - integration of economic dispatch control with LFC.

UNIT III  REACTIVE POWER – VOLTAGE CONTROL
Generation and absorption of reactive power - basics of reactive power control – Automatic Voltage Regulator (AVR) – brushless AC excitation system – block diagram representation of AVR loop - static and dynamic analysis – stability compensation – voltage drop in transmission line - methods of reactive power injection - tap changing transformer, SVC (TCR + TSC) and STATCOM for voltage control.

UNIT IV  ECONOMIC OPERATION OF POWER SYSTEM
Statement of economic dispatch problem - input and output characteristics of thermal plant - incremental cost curve - optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) - base point and participation factors method - statement of unit commitment (UC) problem - constraints on UC problem - solution of UC problem using priority list – special aspects of short term and long term hydrothermal problems.

UNIT V  COMPUTER CONTROL OF POWER SYSTEMS
Need of computer control of power systems-concept of energy control centers and functions – PMU - system monitoring, data acquisition and controls - System hardware configurations - SCADA and EMS functions - state estimation problem – measurements and errors - weighted least square estimation - various operating states - state transition diagram.
TOTAL: 45 PERIODS

OUTCOMES:
- Ability to understand the day-to-day operation of electric power system.
- Ability to analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand.
- Ability to understand the significance of power system operation and control.
- Ability to acquire knowledge on real power-frequency interaction.
- Ability to understand the reactive power-voltage interaction.
- Ability to design SCADA and its application for real time operation.

TEXT BOOKS:

REFERENCES

EE8703 RENEWABLE ENERGY SYSTEMS L T P C
3 0 0 3

OBJECTIVES:
To impart knowledge on the following Topics
- Awareness about renewable Energy Sources and technologies.
- Adequate inputs on a variety of issues in harnessing renewable Energy.
- Recognize current and possible future role of renewable energy sources.

UNIT I RENEWABLE ENERGY (RE) SOURCES
Environmental consequences of fossil fuel use, Importance of renewable sources of energy, Sustainable Design and development, Types of RE sources, Limitations of RE sources, Present Indian and international energy scenario of conventional and RE sources.

UNIT II WIND ENERGY
Power in the Wind – Types of Wind Power Plants(WPPs)–Components of WPPs-Working of WPPs- Siting of WPPs-Grid integration issues of WPPs.
UNIT III SOLAR PV AND THERMAL SYSTEMS

UNIT IV BIOMASS ENERGY

UNIT V OTHER ENERGY SOURCES

TOTAL : 45 PERIODS

OUTCOMES:
• Ability to create awareness about renewable Energy Sources and technologies.
• Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.
• Ability to recognize current and possible future role of renewable energy sources.
• Ability to explain the various renewable energy resources and technologies and their applications.
• Ability to understand basics about biomass energy.
• Ability to acquire knowledge about solar energy.

TEXT BOOKS:

REFERENCES
EE8711 POWER SYSTEM SIMULATION LABORATORY

OBJECTIVES:
- To provide better understanding of power system analysis through digital simulation.

LIST OF EXPERIMENTS
1. Computation of Transmission Line Parameters
2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks
4. Power Flow Analysis using Newton Raphson Method
5. Symmetric and unsymmetrical fault analysis
6. Transient stability analysis of SMIB System
7. Economic Dispatch in Power Systems
8. Load – Frequency Dynamics of Single- Area and Two-Area Power Systems
9. State estimation: Weighted least square estimation

TOTAL: 60 PERIODS

OUTCOMES:
Ability to
- Ability to understand power system planning and operational studies.
- Ability to acquire knowledge on Formation of Bus Admittance and Impedance Matrices and Solution of Networks.
- Ability to analyze the power flow using GS and NR method
- Ability to find Symmetric and Unsymmetrical fault
- Ability to understand the economic dispatch.
- Ability to analyze the electromagnetic transients.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Personal computers (Intel i3, 80GB, 2GBRAM) – 30 nos
2. Printer laser- 1 No.
3. Dot matrix- 1 No.
4. Server (Intel i5, 80GB, 2GBRAM) (High Speed Processor) – 1 No.
5. Software: any power system simulation software with 5 user license
OBJECTIVES:
- To train the students in Renewable Energy Sources and technologies.
- To provide adequate inputs on a variety of issues in harnessing Renewable Energy.
- To recognize current and possible future role of Renewable energy sources.

LIST OF EXPERIMENTS
2. Experiment on “VI-Characteristics and Efficiency of 1kWp Solar PV System”.
3. Experiment on “Shadowing effect & diode based solution in 1kWp Solar PV System”.
5. Simulation study on Wind Energy Generator.
7. Simulation study on Hybrid (Solar-Wind) Power System.
10. Experiment on Performance Assessment of 100W Fuel Cell.

OUTCOMES:
- Ability to understand and analyze Renewable energy systems.
- Ability to train the students in Renewable Energy Sources and technologies.
- Ability to provide adequate inputs on a variety of issues in harnessing Renewable Energy.
- Ability to simulate the various Renewable energy sources.
- Ability to recognize current and possible future role of Renewable energy sources.
- Ability to understand basics of Intelligent Controllers.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the equipments / Components</th>
<th>Quantity Required</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Personal computers (Intel i3, 80GB, 2GBRAM)</td>
<td>15</td>
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<tr>
<td>2</td>
<td>CRO</td>
<td>9</td>
<td>30MHz</td>
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<tr>
<td>3</td>
<td>Digital Multimeter</td>
<td>10</td>
<td>Digital</td>
</tr>
<tr>
<td>4</td>
<td>PV panels - 100W, 24V</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Battery storage system with charge and discharge control 40Ah</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PV Emulator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Micro Wind Energy Generator module</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
**Consumability (Minimum of 5 Nos. each)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>8.</td>
<td>Potentiometer</td>
<td>5</td>
</tr>
<tr>
<td>9.</td>
<td>Step-down transformer</td>
<td>5</td>
</tr>
<tr>
<td>10.</td>
<td>Component data sheets to be provided</td>
<td></td>
</tr>
</tbody>
</table>

**OBJECTIVES:**

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

**OUTCOMES:**

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

**OBJECTIVES:**

- To provide knowledge on design state feedback control and state observer.
- To provide knowledge in phase plane analysis.
- To give basic knowledge in describing function analysis.
- To study the design of optimal controller.
- To study the design of optimal estimator including Kalman Filter

**UNIT I  STATE VARIABLE ANALYSIS 6+6**

Introduction- concepts of state variables and state model-State model for linear continuous time systems, Diagonalisation- solution of state equations- Concepts of controllability and observability.

**UNIT II  STATE VARIABLE DESIGN 6+6**

UNIT III  SAMPLED DATA ANALYSIS  6+6
Introduction spectrum analysis of sampling process signal reconstruction difference equations The Z transform function, the inverse Z transform function, response of Linear discrete system, the Z transform analysis of sampled data control systems, response between sampling instants, the Z and S domain relationship. Stability analysis and compensation techniques.

UNIT IV  NON LINEAR SYSTEMS  6+6

UNIT V  OPTIMAL CONTROL  6+6

TOTAL: 60 PERIODS

OUTCOMES:
   i.  Able to design state feedback controller and state observer.
   ii. Able to understand and analyse linear and nonlinear systems using phase plane method.
   iii. Able to understand and analyse nonlinear systems using describing function method.
   iv.  Able to understand and design optimal controller.
   v.   Able to understand optimal estimator including Kalman Filter.
   vi.  Ability to apply advanced control strategies to practical engineering problems.

TEXT BOOKS:

REFERENCES:

EE8001 VISUAL LANGUAGES AND APPLICATIONS  L  T  P  C
3  0  0  3

OBJECTIVES: To impart knowledge about the following topics:
• To study about the concepts of windows programming models, MFC applications, drawing with the GDI, getting inputs from Mouse and the Keyboard.
• To study the concepts of Menu basics, menu magic and classic controls of the windows programming using VC++.
• To study the concept of Document/View Architecture with single & multiple document
interface, toolbars, status bars and File I/O Serialization.

- To study about the integrated development programming event driven programming, variability, constants, procedures and basic ActiveX controls in visual basic.
- To understand the database and the database management system, visual data manager, data bound controls and ADO controls in VB.

UNIT I  FUNDAMENTALS OF WINDOWS AND MFC  9

UNIT II  RESOURCES AND CONTROLS  9
Creating a menu – Loading and displaying a menu – Responding to menu commands – Command ranges - Updating the items in menu, update ranges – Keyboard accelerators. Creating menus programmatically - Modifying menus programmatically - The system menu - Owner draw menus – Cascading menus - Context menus. The C button class – C list box class – C static class - The font view application – C edit class – C combo box class – C scrollbar class. Model dialog boxes – Modeless dialog boxes.

UNIT III  DOCUMENT / VIEW ARCHITECTURE  9

UNIT IV  FUNDAMENTALS OF VISUAL BASIC  9


UNIT V  DATABASE PROGRAMMING WITH VB  9
object – Simple record editing and updating.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand and apply computing platform and software for engineering problems
- Ability to study about the concepts of windows programming models.
- Ability to study the concepts of Menu basics, menu magic and classic controls.
- Ability to study the concept of Document/View Architecture with single & multiple document interface.
- Ability to study about the integrated development programming event driven programming.
- Ability to understand the database and the database management system.

TEXT BOOKS:

REFERENCES

EE8002 DESIGN OF ELECTRICAL APPARATUS

OBJECTIVES: To impart knowledge about the following topics:
- Magnetic circuit parameters and thermal rating of various types of electrical machines.
- Armature and field systems for D.C. machines.
- Core, yoke, windings and cooling systems of transformers.
- Design of stator and rotor of induction machines and synchronous machines.
- The importance of computer aided design method.

UNIT I DESIGN OF FIELD SYSTEM AND ARMATURE

UNIT II DESIGN OF TRANSFORMERS
Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers. Computer program: Complete Design of single phase core transformer
UNIT III 
DESIGN OF DC MACHINES 
Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – design of field Computer program: Design of Armature main dimensions

UNIT IV 
DESIGN OF INDUCTION MOTORS 

UNIT V 
DESIGN OF SYNCHRONOUS MACHINES 

TOTAL : 45 PERIODS

OUTCOMES:
• Ability to understand basics of design considerations for rotating and static electrical machines
• Ability to design of field system for its application.
• Ability to design sing and three phase transformer.
• Ability to design armature and field of DC machines.
• Ability to design stator and rotor of induction motor.
• Ability to design and analyze synchronous machines.

TEXT BOOKS:

REFERENCES
OBJECTIVES:

- To understand the fundamental concepts of stability of power systems and its classification.
- To expose the students to dynamic behaviour of the power system for small and large disturbances.
- To understand and enhance the stability of power systems.

UNIT I  INTRODUCTION TO STABILITY  9

UNIT II  SMALL-SIGNAL STABILITY  9

UNIT III  TRANSIENT STABILITY  9

UNIT IV  VOLTAGE STABILITY  9
Factors affecting voltage stability- Classification of Voltage stability-Transmission system characteristics- Generator characteristics- Load characteristics- Characteristics of reactive power compensating Devices- Voltage collapse.

UNIT V  ENHANCEMENT OF SMALL-SIGNAL STABILITY AND TRANSIENT STABILITY  9

TOTAL : 45 PERIODS

OUTCOMES:

- Learners will attain knowledge about the stability of power system
- Learners will have knowledge on small-signal stability, transient stability and voltage stability.
- Learners will be able to understand the dynamic behaviour of synchronous generator for different disturbances.
Learners will be able to understand the various methods to enhance the stability of a power system.

TEXT BOOKS:

REFERENCES

EE8004 MODERN POWER CONVERTERS

OBJECTIVES: To impart knowledge about the following topics:
- Switched mode power supplies
- Matrix Converter
- Soft switched converters

UNIT I SWITCHED MODE POWER SUPPLIES (SMPS) 9
DC Power supplies and Classification; Switched mode dc power supplies - with and without isolation, single and multiple outputs; Closed loop control and regulation; Design examples on converter and closed loop performance.

UNIT II AC-DC CONVERTERS 9
Switched mode AC-DC converters. synchronous rectification - single and three phase topologies - switching techniques - high input power factor . reduced input current harmonic distortion. improved efficiency. with and without input-output isolation. performance indices design examples

UNIT III DC-AC CONVERTERS 9
Multi-level Inversion - concept, classification of multilevel inverters, Principle of operation, main features and analysis of Diode clamped, Flying capacitor and cascaded multilevel inverters; Modulation schemes.

UNIT IV AC-AC CONVERTERS WITH AND WITHOUT DC LINK 9
Matrix converters. Basic topology of matrix converter; Commutation – current path; Modulation techniques - scalar modulation, indirect modulation; Matrix converter as only
AC-DC converter; AC-AC converter with DC link - topologies and operation - with and without resonance link - converter with dc link converter; Performance comparison with matrix converter with DC link converters.

UNIT V  SOFT-SWITCHING POWER CONVERTERS  9
Soft switching techniques. ZVS, ZCS, quasi resonance operation; Performance comparison hard switched and soft switched converters. AC-DC converter, DC-DC converter, DC-AC converter.; Resonant DC power supplies.

OUTCOMES:
• Ability to suggest converters for AC-DC conversion and SMPS

TEXT BOOKS:

REFERENCES
1. Power Electronic Circuits, Issa Batarseh, John Wiley and Sons, Inc.2004
UNIT IV DIGITAL PRODUCTS AND LAW

UNIT V ENFORCEMENT OF IPRs
Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL: 45 PERIODS

OUTCOME:
• Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXT BOOKS

REFERENCES:

RO8591 PRINCIPLES OF ROBOTICS

OBJECTIVES:
• To introduce the functional elements of Robotics
• To impart knowledge on the direct and inverse kinematics
• To introduce the manipulator differential motion and control
• To educate on various path planning techniques
• To introduce the dynamics and control of manipulators

UNIT I BASIC CONCEPTS

UNIT II DIRECT AND INVERSE KINEMATICS

UNIT III MANIPULATOR DIFFERENTIAL MOTION AND STATICS
Linear and angular velocities-Manipulator Jacobian-Prismatic and rotary joints–Inverse -Wrist and arm singularity - Static analysis - Force and moment Balance.
UNIT IV  PATH PLANNING
Definition-Joint space technique-Use of p-degree polynomial-Cubic polynomial-Cartesian space technique - Parametric descriptions - Straight line and circular paths - Position and orientation planning.

UNIT V  DYNAMICS AND CONTROL
Lagrangian mechanics-2DOF Manipulator-Lagrange Euler formulation-Dynamic model –Manipulator control problem-Lineal control schemes-PID control scheme-Force control of robotic manipulator.

OUTCOMES:
- Ability to understand basic concept of robotics.
- To analyze Instrumentation systems and their applications to various
- To know about the differential motion add statics in robotics
- To know about the various path planning techniques.
- To know about the dynamics and control in robotics industries.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
To impart knowledge on the following Topics

- Construction, principle of operation, control and performance of stepping motors.
- Construction, principle of operation, control and performance of switched reluctance motors.
- Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
- Construction, principle of operation and performance of permanent magnet synchronous motors.
- Construction, principle of operation and performance of other special machines.

UNIT I  STEPPER MOTORS

UNIT II  SWITCHED RELUCTANCE MOTORS (SRM)

UNIT III  PERMANENT MAGNET BRUSHLESS D.C. MOTORS

UNIT IV  PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM)

UNIT V  OTHER SPECIAL MACHINES

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to analyze and design controllers for special Electrical Machines.
- Ability to acquire the knowledge on construction and operation of stepper motor.
- Ability to acquire the knowledge on construction and operation of stepper switched reluctance motors.
- Ability to construction, principle of operation, switched reluctance motors.
- Ability to acquire the knowledge on construction and operation of permanent magnet brushless D.C. motors.
- Ability to acquire the knowledge on construction and operation of permanent magnet synchronous motors.
- Ability to select a special Machine for a particular application.
TEXT BOOKS:

REFERENCES

EE8006 POWER QUALITY

OBJECTIVES: To impart knowledge about the following topics:
- Causes & Mitigation techniques of various PQ events.
- Various Active & Passive power filters.

UNIT I INTRODUCTION TO POWER QUALITY
Terms and definitions & Sources – Overloading, under voltage, over voltage - Concepts of transients - Short duration variations such as interruption - Long duration variation such as sustained interruption - Sags and swells - Voltage sag - Voltage swell - Voltage imbalance – Voltage fluctuations - Power frequency variations - International standards of power quality – Computer Business Equipment Manufacturers Associations (CBEMA) curve

UNIT II VOLTAGE SAG AND SWELL

UNIT III HARMONICS

UNIT IV PASSIVE POWER COMPENSATORS
and Its Mitigation. Fundamentals of load compensation – voltage regulation & power factor correction.

UNIT V POWER QUALITY MONITORING & CUSTOM POWER DEVICES 9

OUTCOMES:
- Ability to understand various sources, causes and effects of power quality issues, electrical systems and their measures and mitigation.
- Ability to analyze the causes & Mitigation techniques of various PQ events.
- Ability to study about the various Active & Passive power filters.
- Ability to understand the concepts about Voltage and current distortions, harmonics.
- Ability to analyze and design the passive filters.
- Ability to acquire knowledge on compensation techniques.
- Ability to acquire knowledge on DVR.

TEXT BOOKS:

REFERENCES
UNIT II  ELECTROSTATIC FIELDS
Electrostatic field and voltage gradients – Calculations of electrostatic field of AC lines – Effect of high electrostatic field on biological organisms and human beings - Surface voltage gradients and Maximum gradients of actual transmission lines – Voltage gradients on sub conductor.

UNIT III  POWER CONTROL
Electrostatic induction in un energized lines – Measurement of field and voltage gradients for three phase single and double circuit lines – Un energized lines. Power Frequency Voltage control and overvoltage in EHV lines: No load voltage – Charging currents at power frequency-Voltage control – Shunt and Series compensation – Static VAR compensation.

UNIT IV  CORONA EFFECTS AND RADIO INTERFERENCE
Corona in EHV lines – Corona loss formulae-Charge voltage diagram- Attenuation of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits. Measurements of audio noise radio interference due to Corona - properties of radio noise – Frequency spectrum of RI fields – Measurements of RI and RIV.

UNIT V  STEADY STATE AND TRANSIENT LIMITS
Design of EHV lines based on steady state and transient limits - EHV cabilites and their characteristics-Introduction six phase transmission – UHV.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand the principles and types of EHVAC system.
- Ability to analyze the electrostatic field of AC lines
- Ability to study about the compensation.
- Ability to study about the corona in E.H.V. lines
- Ability to understand the EHV cabiltys.
- Ability to analyze the steady state and transient limits.

TEXT BOOKS:

REFERENCES
OBJECTIVES:
• To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
• To study the various analog and digital modulation techniques
• To study the principles behind information theory and coding
• To study the various digital communication techniques

UNIT I  ANALOG MODULATION

UNIT II  PULSE MODULATION
Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing

UNIT III  DIGITAL MODULATION AND TRANSMISSION
Phase shift keying – BPSK, DPK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers

UNIT IV  INFORMATION THEORY AND CODING
Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon’s limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding

UNIT V  SPREAD SPECTRUM AND MULTIPLE ACCESS
PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA,

OUTCOMES:
At the end of the course, the student should be able to:
• Ability to comprehend and appreciate the significance and role of this course in the present contemporary world
• Apply analog and digital communication techniques.
• Use data and pulse communication techniques.
• Analyze Source and Error control coding.

TEXT BOOKS:
2. S. Haykin “Digital Communications” John Wiley 2005

REFERENCES:
2. H P Hsu, Schaum Outline Series – “Analog and Digital Communications” TMH 2006
OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

UNIT I INTRODUCTION TO DISASTERS
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be ability to
- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
• Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

GE8074 HUMAN RIGHTS

OBJECTIVES:
• To sensitize the Engineering students to various aspects of Human Rights.

UNIT I

UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL : 45 PERIODS

OUTCOME:
• Engineering students will acquire the basic knowledge of human rights.
REFERENCES:

MG8491 OPERATIONS RESEARCH

OBJECTIVES:
• To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I LINEAR MODELS 15

UNIT II TRANSPORTATION MODELS AND NETWORK MODELS 8

UNIT III INVENTORY MODELS 6
Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV QUEUEING MODELS 6
Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V DECISION MODELS 10

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of this course, the students can ability to use the optimization techniques for use engineering and Business problems

TEXT BOOK:

REFERENCES:
MA8391 PROBABILITY AND STATISTICS

OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT I PROBABILITY AND RANDOM VARIABLES


UNIT II TWO-DIMENSIONAL RANDOM VARIABLES

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTING OF HYPOTHESIS

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS

One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - $2^2$ factorial design.

UNIT V STATISTICAL QUALITY CONTROL

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL: 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:
• Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
• Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
• Apply the concept of testing of hypothesis for small and large samples in real life problems.
• Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
• Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

TEXT BOOKS :

REFERENCES :

EI8075 FIBRE OPTICS AND LASER INSTRUMENTS LT P C 3 0 0 3

AIM:
To contribute to the knowledge of Fibre optics and Laser Instrumentation and its Industrial and Medical Application.

COURSE OBJECTIVES
• To expose the students to the basic concepts of optical fibres and their properties.
• To provide adequate knowledge about the Industrial applications of optical fibres.
• To expose the students to the Laser fundamentals.
• To provide adequate knowledge about Industrial application of lasers.
• To provide adequate knowledge about holography and Medical applications of Lasers.

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES
UNIT II   INDUSTRIAL APPLICATION OF OPTICAL FIBRES

UNIT III   LASER FUNDAMENTALS

UNIT IV   INDUSTRIAL APPLICATION OF LASERS

UNIT V   HOLOGRAM AND MEDICAL APPLICATIONS

TOTAL : 45 PERIODS

COURSE OUTCOMES (COs):
1. Understand the principle, transmission, dispersion and attenuation characteristics of optical fibers
2. Apply the gained knowledge on optical fibers for its use as communication medium and as sensor as well which have important applications in production, manufacturing industrial and biomedical applications.
4. Students will gain ability to apply laser theory for the selection of lasers for a specific Industrial and medical application.

TEXT BOOKS:

REFERENCES:
GE8072  FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT  

OBJECTIVES:
- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them into design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I  FUNDAMENTALS OF PRODUCT DEVELOPMENT

UNIT II  REQUIREMENTS AND SYSTEM DESIGN

UNIT III  DESIGN AND TESTING

http://nptel.ac.in/courses/117101002/
UNIT IV  SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT  9

UNIT V  BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY  9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:

• Define, formulate and analyze a problem
• Solve specific problems independently or as part of a team
• Gain knowledge of the Innovation & Product Development process in the Business Context
• Work independently as well as in teams
• Manage a project from start to finish

TEXTBOOKS:
1. Book specially prepared by NASSCOM as per the MoU.

REFERENCES:
OBJECTIVES: To impart knowledge about the following topics:
- The concept of system identification and adaptive control
- Black-box approach based system identification
- Batch and recursive identification
- Computer Controlled Systems
- Design concept for adaptive control schemes

UNIT I  NON-PARAMETRIC METHODS
Non-parametric methods - Transient analysis - frequency analysis - Correlation analysis - Spectral analysis - Input signal design for identification

UNIT II  PARAMETRIC METHODS
Least squares estimation – Analysis of the least squares estimate - Best linear unbiased estimate – Model parameterizations - Prediction error methods.

UNIT III  RECURSIVE IDENTIFICATION METHODS
The recursive least square method - Model validation –Model structure determination - Introduction to closed loop system identification.

UNIT IV  ADAPTIVE CONTROL SCHEMES

UNIT V  MODEL-REFERENCE ADAPTIVE SYSTEM (MRAS) and SELF-TUNING REGULATOR (STR)
STR – Pole placement design – Indirect STR and direct STR – MRAC - MIT rule – Lyapunov theory – Relationship between MRAC and STR.

OUTCOMES:
- Ability to understand various system identification techniques and features of adaptive control like STR and MRAC.
- Ability to understand the concept of system identification and adaptive control
- Ability to understand about Black-box approach based system identification
- Ability to get knowledge about batch and recursive identification
- Ability to study about computer controlled systems
- Ability to design concept for adaptive control schemes

TEXT BOOKS:

REFERENCES
1.  L. Ljung, System Identification - Theory for the User, 2nd edition, PTR Prentice Hall,
OBJECTIVES:

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices.

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM


UNIT II ARITHMETIC FOR COMPUTERS

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISIM


UNIT V MEMORY & I/O SYSTEMS


TOTAL : 45 PERIODS
OUTCOMES:
On Completion of the course, the students should be able to:
- Understand the basics structure of computers, operations and instructions.
- Design arithmetic and logic unit.
- Understand pipelined execution and design control unit.
- Understand parallel processing architectures.
- Understand the various memory systems and I/O communication.

TEXT BOOKS:

REFERENCES

EE8009 CONTROL OF ELECTRICAL DRIVES

OBJECTIVES: To impart knowledge about the following topics:
- To understand the DC drive control.
- To study and analyze the Induction motor drive control.
- To study and understand the Synchronous motor drive control.
- To study and analyze the SRM and BLDC motor drive control.
- To analyze and design the Digital control for drives.

UNIT I CONTROL OF DC DRIVES

UNIT II CONTROL OF INDUCTION MOTORDRIVE

UNIT III CONTROL OF SYNCHRONOUS MOTOR DRIVES
Open loop VSI fed drive and its characteristics–Self control–Torque control –Torque angle
control—Power factor control—Brushless excitation systems—Field oriented control—Design of closed loop operation of Self control of Synchronous motor drive systems.

UNIT IV     CONTROL OF SRM AND BLDC MOTOR DRIVES

SRM construction - Principle of operation - SRM drive design factors-Torque controlled SRM- Block diagram of Instantaneous Torque control using current controllers and flux controllers. Construction and Principle of operation of BLDC Machine -Sensing and logic switching scheme,-Sinusoidal and trapezoidal type of Brushless dc motors – Block diagram of current controlled Brushless dc motor drive.

UNIT V     DIGITAL CONTROL OF DC DRIVE

Phase Locked Loop and micro-computer control of DC drives--Program flow chart for constant constant torque and constant horse power operations Speed detection and current sensing circuits and feedback elements.

TOTAL :  45 PERIODS

OUTCOMES:

• Ability to understand various control strategies and controllers for AC and DC Motor Drive systems.

TEXT BOOKS:


REFERENCES


EC8095     VLSI DESIGN

OBJECTIVES:

• Study the fundamentals of CMOS circuits and its characteristics.
• Learn the design and realization of combinational & sequential digital circuits.
• Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed
• Learn the different FPGA architectures and testability of VLSI circuits.
UNIT I  INTRODUCTION TO MOS TRANSISTOR

UNIT II  COMBINATIONAL MOS LOGIC CIRCUITS

UNIT III  SEQUENTIAL CIRCUIT DESIGN
Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmmit Trigger, Monostability Sequential Circuits, Astability Sequential Circuits.

UNIT IV  DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM
Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.
Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

UNIT V  IMPLEMENTATION STRATEGIES AND TESTING
FPGA Building Block Architectures, FPGA Interconnect Routing Procedures.

TOTAL : 45 PERIODS

OUTCOMES:
UPON COMPLETION OF THE COURSE, STUDENTS SHOULD ABILITY TO
  • Realize the concepts of digital building blocks using MOS transistor.
  • Design combinational MOS circuits and power strategies.
  • Design and construct Sequential Circuits and Timing systems.
  • Design arithmetic building blocks and memory subsystems.
  • Apply and implement FPGA design flow and testing.

TEXT BOOKS:

REFERENCES
EE8010  POWER SYSTEMS TRANSIENTS  L  T  P  C
3  0  0  3

OBJECTIVES: To impart knowledge about the following topics:
- Generation of switching transients and their control using circuit – theoretical concept.
- Mechanism of lighting strokes and the production of lighting surges.
- Propagation, reflection and refraction of travelling waves.
- Voltage transients caused by faults, circuit breaker action, load rejection on integrated power system.

UNIT I  INTRODUCTION AND SURVEY  9
Review and importance of the study of transients - causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems – role of the study of transients in system planning.

UNIT II  SWITCHING TRANSIENTS  9

UNIT III  LIGHTNING TRANSIENTS  9
Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds – mechanism of lightning discharges and characteristics of lightning strokes – model for lightning stroke - factors contributing to good line design - protection using ground wires - tower footing resistance - Interaction between lightning and power system.

UNIT IV  TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS  9
Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely’s lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.

UNIT V  TRANSIENTS IN INTEGRATED POWER SYSTEM  9
The short line and kilometric fault - distribution of voltages in a power system - Line dropping and load rejection - voltage transients on closing and reclosing lines - over
voltage induced by faults - switching surges on integrated system. Qualitative application of EMTP for transient computation.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand and analyze switching and lightning transients.
- Ability to acquire knowledge on generation of switching transients and their control.
- Ability to analyze the mechanism of lightning strokes.
- Ability to understand the importance of propagation, reflection and refraction of travelling waves.
- Ability to find the voltage transients caused by faults.
- Ability to understand the concept of circuit breaker action, load rejection on integrated power system.

TEXT BOOKS:

REFERENCES

GE8077 TOTAL QUALITY MANAGEMENT 3 0 0 3

OBJECTIVE:
- To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.
UNIT III TQM TOOLS AND TECHNIQUES I 9
The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9
Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM 9

TOTAL: 45 PERIODS

OUTCOME:
• The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

REFERENCES:
4. ISO9001-2015 standards

EE8011 FLEXIBLE AC TRANSMISSION SYSTEMS L T P C
3 0 0 3

OBJECTIVES: To impart knowledge about the following topics:
• The start-of-art of the power system
• Performance of power systems with FACTS controllers.
• FACTS controllers for load flow and dynamic analysis

UNIT I INTRODUCTION 9
Real and reactive power control in electrical power transmission lines–loads & system compensation-Uncompensated transmission line–shunt and series compensation.

UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS 9
Steady state power transfer – Enhancement of power system damping.

UNIT III  THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS

UNIT IV  VOLTAGE SOURCE CONVERTER BASED FACTS CONTROLLERS

UNIT V  ADVANCED FACTS CONTROLLERS
Interline DVR (IDVR) - Unified Power flow controller (UPFC) - Interline power flow controller (IPFC) - Unified Power quality conditioner (UPQC).

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand, analyze and develop analytical model of FACTS controller for power system application.
- Ability to understand the concepts about load compensation techniques.
- Ability to acquire knowledge on facts devices.
- Ability to understand the start-of-art of the power system
- Ability to analyze the performance of steady state and transients of facts controllers.
- Ability to study about advanced FACTS controllers.

TEXT BOOKS:

REFERENCES
OBJECTIVES: To impart knowledge about the following topics:

- Basics of artificial neural network.
- Concepts of modelling and control of neural and fuzzy control schemes.
- Features of hybrid control schemes.

UNIT I  ARTIFICIAL NEURAL NETWORK


UNIT II  NEURAL NETWORKS FOR MODELING AND CONTROL


UNIT III  FUZZY SET THEORY


UNIT IV  FUZZY LOGIC FOR MODELING AND CONTROL


UNIT V  HYBRID CONTROL SCHEMES


TOTAL: 45 PERIODS

OUTCOMES:

- Ability to understand the concepts of ANN, different features of fuzzy logic and their modelling, control aspects and different hybrid control schemes.
- Ability to understand the basics of artificial neural network.
- Ability to get knowledge on modelling and control of neural.
- Ability to get knowledge on modelling and control of fuzzy control schemes.
- Ability to acquire knowledge on hybrid control schemes.
- Ability to understand the concepts of Adaptive Resonance Theory

TEXT BOOKS:

REFERENCES

EE8013 POWER SYSTEMS DYNAMICS L T P C
3 0 0 3

OBJECTIVES: To impart knowledge about the following topics:
• Basics of dynamics and stability problems
• Modeling of synchronous machines
• Excitation system and speed-governing controllers.
• Small signal stability of a single-machine infinite bus system with excitation system and power system stabilizer.
• Transient stability simulation of multi machine power system.

UNIT I INTRODUCTION
Basics of system dynamics – numerical techniques – introduction to software packages to study the responses. Concept and importance of power system stability in the operation and design - distinction between transient and dynamic stability - complexity of stability problem in large system – necessity for reduced models - stability of interconnected systems.

UNIT II SYNCHRONOUS MACHINE MODELLING
Synchronous machine - flux linkage equations - Park’s transformation - per unit conversion - normalizing the equations - equivalent circuit - current space model - flux linkage state space model. Sub-transient and transient inductances - time constants. Simplified models (one axis and constant flux linkage) - steady state equations and phasor diagrams.

UNIT III MACHINE CONTROLLERS
Exciter and voltage regulators - function and types of excitation systems - typical excitation system configuration - block diagram and state space representation of IEEE type 1 excitation system - saturation function - stabilizing circuit. Function of speed governing systems - block diagram and state space representation of IEEE mechanical hydraulic governor and electrical hydraulic governors for hydro turbines and steam turbines.
UNIT IV  TRANSIENT STABILITY
State equation for multi machine system with one axis model and simulation – modelling of multi machine power system with one axis machine model including excitation system and speed governing system and simulation using R-K method of fourth order (Gill’s technique) for transient stability analysis - power system stabilizer. For all simulations, the algorithm and flow chart have to be discussed.

UNIT V  DYNAMIC STABILITY

TOTAL : 45 PERIODS

OUTCOMES:
• Ability to understand and analyze power system operation, stability, control and protection.
• Ability to get knowledge on the basics of dynamics and stability problems
• Ability to design and modelling of synchronous machines
• Ability to study about excitation system and speed-governing controllers.
• Ability to understand the concept of small signal stability of a single-machine infinite bus system with excitation system.
• Ability to analyze the transient stability simulation.

TEXT BOOKS:

REFERENCES
OBJECTIVES: To impart knowledge about the following topics:
- Modern power electronic converters and its applications in electric power utility.
- Resonant converters and UPS

UNIT I DC-DC CONVERTERS
Principles of step down and step up converters – Analysis and state space modeling of Buck, Boost, Buck- Boost and Cuk converters.

UNIT II SWITCHED MODE POWER CONVERTERS
Analysis and state space modeling of fly back, Forward, Push pull, Luo, Half bridge and full bridge converters- control circuits and PWM techniques.

UNIT III RESONANT CONVERTERS
Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS , Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control.

UNIT IV DC-AC CONVERTERS
Single phase and three phase inverters, control using various (sine PWM, SVPWM and PSPWM) techniques, various harmonic elimination techniques- Multilevel inverters- Concepts - Types: Diode clamped- Flying capacitor- Cascaded types- Applications.

UNIT V POWER CONDITIONERS, UPS & FILTERS

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to analyze the state space model for DC – DC converters
- Ability to acquire knowledge on switched mode power converters.
- Ability to understand the importance of Resonant Converters.
- Ability to analyze the PWM techniques for DC-AC converters
- Ability to acquire knowledge on modern power electronic converters and its applications in electric power utility.
- Ability to acquire knowledge on filters and UPS

TEXT BOOKS:

REFERENCES
3. M.H. Rashid – Power Electronics circuits, devices and applications- third edition
   Prentice Hall of India New Delhi, 2007.

EE8015 ELECTRIC ENERGY GENERATION, UTILIZATION AND CONSERVATION

OBJECTIVES:
To impart knowledge on the following Topics
- To study the generation, conservation of electrical power and energy efficient equipments.
- To understand the principle, design of illumination systems and energy efficiency lamps.
- To study the methods of industrial heating and welding.
- To understand the electric traction systems and their performance.

UNIT I ILLUMINATION
Importance of lighting – properties of good lighting scheme – laws of illumination – photometry -
types of lamps – lighting calculations – basic design of illumination schemes for residential, commercial, street lighting, factory lighting and flood lighting – LED lighting and energy efficient lamps.

UNIT II REFRIGERATION AND AIR CONDITIONING

UNIT III HEATING AND WELDING
Role of electric heating for industrial applications – resistance heating – induction heating –
dielectric heating - electric arc furnaces. Brief introduction to electric welding – welding generator, welding transformer and the characteristics.

UNIT IV TRACTION
Merits of electric traction – requirements of electric traction system – supply systems –
mechanics of train movement – traction motors and control – braking – recent trends in electric traction.

UNIT V DOMESTIC UTILIZATION OF ELECTRICAL ENERGY
Domestic utilization of electrical energy – House wiring. Induction based appliances, Online and
OFF line UPS, Batteries - Power quality aspects – nonlinear and domestic loads – Earthing –
Domestic, Industrial and Substation.

TOTAL : 45 PERIODS

OUTCOMES:
- To understand the main aspects of generation, utilization and conservation.
- To identify an appropriate method of heating for any particular industrial application.
- To evaluate domestic wiring connection and debug any faults occurred.
- To construct an electric connection for any domestic appliance like refrigerator as well as to design a battery charging circuit for a specific household application.
- To realize the appropriate type of electric supply system as well as to evaluate the
performance of a traction unit.

- To understand the main aspects of Traction.

**TEXT BOOKS:**

**REFERENCES**

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**GE8076 PROFESSIONAL ETHICS IN ENGINEERING**

**OBJECTIVES:**
- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

**UNIT I HUMAN VALUES**

**UNIT II ENGINEERING ETHICS**

**UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION**
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

**UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS**
UNIT V  GLOBAL ISSUES

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

REFERENCES:

Web sources:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

MG8591  PRINCIPLES OF MANAGEMENT  LT P C
3 0 0 3

OBJECTIVES:
• To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I  INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS
UNIT II      PLANNING

UNIT III      ORGANISING

UNIT IV      DIRECTING

UNIT V      CONTROLLING
System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of the course, students will be ability to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:

REFERENCES:
OBJECTIVES: To impart knowledge about the following topics:

- To impact concepts behind economic analysis and Load management.
- Energy management on various electrical equipments and metering.
- Concept of lighting systems and cogeneration.

UNIT I INTRODUCTION

UNIT II ENERGY MANAGEMENT FOR MOTORS AND COGENERATION

UNIT III LIGHTING SYSTEMS

UNIT IV METERING FOR ENERGY MANAGEMENT
Metering for energy management – Units of measure - Utility meters – Demand meters – Paralleling of current transformers – Instrument transformer burdens – Multi tasking solid state meters, metering location vs requirements, metering techniques and practical examples.

UNIT V ECONOMIC ANALYSIS AND MODELS

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to understand the basics of Energy audit process.
- Ability to understand the basics of energy management by cogeneration
- Ability to acquire knowledge on Energy management in lighting systems
- Ability to impact concepts behind economic analysis and Load management.
- Ability to understand the importance of Energy management on various electrical equipment and metering.
- Ability to acquire knowledge on HVAC.

TEXT BOOKS:
REFERENCES

CS8391 DATA STRUCTURES

OBJECTIVES:
- To understand the concepts of ADTs
- To Learn linear data structures – lists, stacks, and queues
- To understand sorting, searching and hashing algorithms
- To apply Tree and Graph structures

UNIT I  LINEAR DATA STRUCTURES – LIST
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists- circularly linked lists- doubly-linked lists – applications of lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II  LINEAR DATA STRUCTURES – STACKS, QUEUES

UNIT III  NON LINEAR DATA STRUCTURES – TREES

UNIT IV  NON LINEAR DATA STRUCTURES - GRAPHS

UNIT V  SEARCHING, SORTING AND HASHING TECHNIQUES

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Implement abstract data types for linear data structures.
- Apply the different linear and non-linear data structures to problem solutions.
- Critically analyze the various sorting algorithms.
TEXT BOOKS:

REFERENCES:

EE8017 HIGH VOLTAGE DIRECT CURRENT TRANSMISSION

OBJECTIVES: To impart knowledge about the following topics:
- Planning of DC power transmission and comparison with AC power transmission.
- HVDC converters.
- HVDC system control.
- Harmonics and design of filters.
- Power flow in HVDC system under steady state.

UNIT I INTRODUCTION
DC Power transmission technology—Comparison of AC and DC transmission—Application of DC transmission—Description of DC transmission system—Planning for HVDC transmission—Modern trends in HVDC technology—DC breakers—Operating problems—HVDC transmission based on VSC—Types and applications of MTDC systems.

UNIT II ANALYSIS OF HVDC CONVERTERS
Line commutated converter - Analysis of Graetz circuit with and without overlap - Pulse number— Choice of converter configuration – Converter bridge characteristics– Analysis of a 12 pulse converters– Analysis of VSC topologies and firing schemes.

UNIT III CONVERTER AND HVDC SYSTEM CONTROL
Principles of DC link control—Converter control characteristics—System control hierarchy—Firing angle control—Current and extinction angle control—Starting and stopping of DC link—Power control—Higher level controllers—Control of VSC based HVDC link.

UNIT IV REACTIVE POWER AND HARMONICS CONTROL
Reactive power requirements in steady state—Sources of reactive power—SVC and STATCOM—Generation of harmonics—Design of AC and DC filters—Active filters.

UNIT V POWER FLOW ANALYSIS IN AC/DC SYSTEMS
Per unit system for DC quantities—DC system model—Inclusion of constraints—Power flow analysis—case study

TOTAL: 45 PERIODS
OUTCOMES:
- Ability to understand the principles and types of HVDC system.
- Ability to analyze and understand the concepts of HVDC converters.
- Ability to acquire knowledge on DC link control.
- Ability to understand the concepts of reactive power management, harmonics and power flow analysis.
- Ability to get knowledge about Planning of DC power transmission and comparison with AC power transmission.
- Ability to understand the importance of power flow in HVDC system under steady state.

TEXT BOOKS:

REFERENCES

EE8018 MICROCONTROLLER BASED SYSTEM DESIGN

OBJECTIVES: To impart knowledge about the following topics:
- Architecture of PIC microcontroller
- Interrupts and timers
- Peripheral devices for data communication and transfer
- Functional blocks of ARM processor
- Architecture of ARM processors

UNIT I INTRODUCTION TO PIC MICROCONTROLLER

UNIT II INTERRUPTS AND TIMER

UNIT III PERIPHERALS AND INTERFACING
I²C Bus for Peripherals Chip Access– Bus operation-Bus subroutines– Serial EEPROM—Analog to Digital Converter–UART-Baud rate selection–Data handling circuit–Initialization -
LCD and keyboard Interfacing - ADC, DAC, and Sensor Interfacing.

UNIT IV  INTRODUCTION TO ARM PROCESSOR  9
Architecture–ARM programmer’s model–ARM Development tools– Memory Hierarchy–
ARM Assembly Language Programming–Simple Examples–Architectural Support for
Operating systems.

UNIT V  ARM ORGANIZATION  9
3-Stage Pipeline ARM Organization–5-Stage Pipeline ARM Organization–ARM Instruction
Execution–ARM Implementation–ARM Instruction Set–ARM coprocessor interface–
Architectural support for High Level Languages – Embedded ARM Applications.

TOTAL: 45 PERIODS

OUTCOMES:
• Ability to understand and apply computing platform and software for engineering
  problems.
• Ability to understand the concepts of Architecture of PIC microcontroller
• Ability to acquire knowledge on Interrupts and timers.
• Ability to understand the importance of Peripheral devices for data communication.
• Ability to understand the basics of sensor interfacing
• Ability to acquire knowledge in Architecture of ARM processors

TEXT BOOKS:
   2004.
2. Furber, S., “ARM System on Chip Architecture” Addison Wesley trade Computer

REFERENCES
   India, 2007.

EE8019 SMART GRID

OBJECTIVES: To impart knowledge about the following topics:
• Smart Grid technologies, different smart meters and advanced metering infrastructure.
• The power quality management issues in Smart Grid.
• The high performance computing for Smart Grid applications

UNIT I  INTRODUCTION TO SMART GRID  9
Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers,
functions, opportunities, challenges and benefits, Difference between conventional & Smart
Grid, National and International Initiatives in Smart Grid.
UNIT II  SMART GRID TECHNOLOGIES  9
Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAR control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plugin Hybrid Electric Vehicles(PHEV).

UNIT III  SMART METERS AND ADVANCED METERING INFRASTRUCTURE  9
Introduction to SmartMeters, Advanced Metering infrastructure(AMI) drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.

UNIT IV  POWER QUALITY MANAGEMENT IN SMART GRID  9

UNIT V  HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS  9
Local Area Network(LAN), House Area Network(HAN), Wide Area Network(WAN), Broadband over Power line(BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

OUTCOMES:

- Learners will develop more understanding on the concepts of Smart Grid and its present developments.
- Learners will study about different Smart Grid technologies.
- Learners will acquire knowledge about different smart meters and advanced metering infrastructure.
- Learners will have knowledge on power quality management in Smart Grids.
- Learners will develop more understanding on LAN, WAN and Cloud Computing for Smart Grid applications.

TEXT BOOKS:

REFERENCES
OBJECTIVES:
- To Introduce Fundamentals of Biomedical Engineering
- To study the communication mechanics in a biomedical system with few examples
- To study measurement of certain important electrical and non-electrical parameters
- To understand the basic principles in imaging techniques
- To have a basic knowledge in life assisting and therapeutic devices

UNIT I  FUNDAMENTALS OF BIOMEDICAL ENGINEERING  9

UNIT II  NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES  9

UNIT III  ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS  9

UNIT IV  IMAGING MODALITIES AND ANALYSIS  9

UNIT V  LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES  9

TOTAL :  45  PERIODS

OUTCOMES: At the end of the course students will have the
- Ability to understand the philosophy of the heart, lung, blood circulation and respiration system.
- Ability to provide latest ideas on devices of non-electrical devices.
- Ability to gain knowledge on various sensing and measurement devices of electrical origin.
- Ability to understand the analysis systems of various organ types.
- Ability to bring out the important and modern methods of imaging techniques and their
analysis.
- Ability to explain the medical assistance/techniques, robotic and therapeutic equipments.

TEXT BOOKS:

REFERENCES

GE8073 FUNDAMENTALS OF NANOSCIENCE L T P C
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OBJECTIVES:
To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12
UNIT IV CHARACTERIZATION TECHNIQUES


UNIT V APPLICATIONS


TOTAL : 45 PERIODS

OUTCOMES:
• Will familiarize about the science of nanomaterials
• Will demonstrate the preparation of nanomaterials
• Will develop knowledge in characteristic nanomaterial

TEXT BOOKS:

REFERENCES: