UNIVERSITY DEPARTMENTS

REGULATIONS 2012

CURRICULA AND SYLLABI FOR I TO VIII SEMESTERS

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING (FULL TIME)
Program Educational Objectives

Bachelor of Electrical and Electronics Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

1. Have successful professional and technical career
2. have strong foundation in basic sciences, mathematics and computational platforms
3. have knowledge on the theory and practices in the field of electrical power engineering and allied areas
4. engross in life-long learning to keep themselves abreast of new developments
5. practice and inspire high ethical values and technical standards

Program Outcome

a) Ability to apply knowledge of mathematics, sciences and engineering
b) Ability to understand and apply basic theorems and postulates in circuit, field and control theories
c) Ability to identify, formulate, and solve electrical power engineering problems
d) Ability to analyse and apply electronics in the field of electrical power apparatus and systems
e) Ability to understand and apply computational platforms and software tools for engineering applications
f) Ability to understand ethical and professional responsibilities
g) Ability to communicate effectively and work in interdisciplinary groups
h) Ability to review, comprehend and report technological developments

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OBJECTIVES:

• To enable all students of engineering and technology develop their basic communication skills in English.

• To give special emphasis to the development of speaking skills amongst the students of engineering and technology students.

• To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.

• To inculcate the habit of reading for pleasure.

UNIT I

Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one’s leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II

Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking & answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Lab descriptions (general/specific description of laboratory experiments) - Definitions - Recommendations; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association; E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III

Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause & effect / compare & contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of
sequence words - Adjectives; **Vocabulary** - Different forms and uses of words, Cause and effect words; **E-materials** - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

**UNIT IV**

**Listening** - Watching videos / documentaries and responding to questions based on them; **Speaking** - Responding to questions - Different forms of interviews - Speaking at different types of interviews; **Reading** - Making inference from the reading passage - Predicting the content of a reading passage; **Writing** - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; **Grammar** - Adverbs – Tenses – future time reference; **Vocabulary** - Single word substitutes - Use of abbreviations & acronyms; **E-materials** - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

**UNIT V**

**Listening** - Listening to different accents, Listening to Speeches / Presentations, Listening to broadcast & telecast from Radio & TV; **Speaking** - Giving impromptu talks, Making presentations on given topics; **Reading** - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email **Writing** - Creative writing, Poster making; **Grammar** - Direct and indirect speech; **Vocabulary** - Lexical items (fixed / semi fixed expressions); **E-materials** - Interactive exercises for Grammar & Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents, - Interpreting posters

**OUTCOMES:**

Learners should be able to

- speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- read different genres of texts adopting various reading strategies.
- listen/view and comprehend different spoken discourses/excerpts in different accents

**TEXT BOOKS**


**REFERENCE BOOKS**


**EXTENSIVE READERS**


**WEBSITE RESOURCES**

- www.uefap.com
- www.eslcafe.com
- www.listen-to-english.com
- www.owl.english.purdue.edu
- www.chompchomp.com

**MA8151 MATHEMATICS – I**

(Common to all branches of B.E. / B.Tech. Programmes) 3 1 0 4

**OBJECTIVES:**

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
• To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
• To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES


UNIT II INFINITE SERIES


UNIT III FUNCTIONS OF SEVERAL VARIABLES


UNIT IV IMPROPER INTEGRALS


UNIT V MULTIPLE INTEGRALS


TOTAL: 60 PERIODS
OUTCOMES:

- This course equips students to have basic knowledge and understanding in one fields of materials and integral

TEXT BOOKS:


REFERENCES:


PH8151 ENGINEERING PHYSICS L T P C
(Common to ALL Branches of B.E./B.Tech. Programmes) 3 0 0 3

OBJECTIVE

- To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I PROPERTIES OF MATTER


UNIT II ACOUSTICS AND ULTRASONICS

Classification of sound - loudness and intensity - Weber-Fechner Law - standard intensity and intensity level - decibel - reverberation - reverberation time - rate of growth and decay of sound

UNIT III THERMAL PHYSICS


UNIT IV APPLIED OPTICS


UNIT V SOLID STATE PHYSICS

Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

TOTAL: 45 PERIODS

OUTCOMES:
- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications

TEXTBOOKS:
REFERENCE BOOKS:

CY8151 ENGINEERING CHEMISTRY (Common to all branches of Engineering and Technology) 3 0 0 3

OBJECTIVES:
- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I CHEMICAL THERMODYNAMICS
Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius-Clapeyron equation; Maxwell relations – Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT II POLYMER CHEMISTRY
Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

UNIT III KINETICS AND CATALYSIS
UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY


UNIT V NANOCHEMISTRY


TOTAL : 45 PERIODS

OUTCOMES:

- The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, kinetics and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

TEXT BOOKS


REFERENCE BOOKS

OBJECTIVES:
The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS

UNIT IV FUNCTIONS AND POINTERS

UNIT V STRUCTURES AND UNIONS
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL : 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Design C Programs for problems.
- Write and execute C programs for simple applications.
TEXTBOOKS

REFERENCES

GE8152

ENGINEERING GRAPHICS

L T P C
2 0 3 4

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 FREE HAND SKETCHING

Basic Geometrical constructions, Curves used in engineering practices
Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II

PROJECTION OF POINTS, LINES AND PLANE SURFACES

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 trapezoidal 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

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 and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES

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. Development of lateral surfaces of solids with cut-outs and holes

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

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 and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)

Introduction to drafting packages and demonstration of their use.

TOTAL: 75 PERIODS

OUTCOMES:

On Completion of the course the student will be able to

- perform free hand sketching of basic geometrical constructions and multiple views of objects.
- do orthographic projection of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- prepare isometric and perspective sections of simple solids.
- demonstrate computer aided drafting

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.
OBJECTIVES:

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

1. Torsional pendulum
   Determination of rigidity modulus of wire and moment of inertia of disc.

2. Non–uniform bending
   Determination of young’s modulus

3. Lee’s disc
   Determination of thermal conductivity of a bad conductor

4. Potentiometer
   Determination of thermo e.m.f. of thermocouple

5. Air wedge
   Determination of thickness of a thin sheet of paper

6. i. Optical fibre
   Determination of Numerical Aperture and acceptance angle
   ii. Compact disc
   Determination of width of the groove using laser

7. Acoustic grating
   Determination of velocity of ultrasonic waves in liquids

8. Post office box
   Determination of Band gap of a semiconductor

9. Spectrometer
   Determination of wavelength using grating

10. Viscosity of liquids
    Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

TOTAL: 30 PERIODS

OUTCOMES:

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.
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.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 30 PERIODS

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

REFERENCES
OBJECTIVES:

The student should be made to:

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

LIST OF EXPERIMENTS:

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function and conversion from given program to flow chart.
10. Program using structures and unions.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.
OBJECTIVE
• 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 & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICE

PLUMBING
• Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
• Laying pipe connection to the suction side of a pump – inlet.
• Laying pipe connection to the delivery side of a pump – outlet.
• Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
• Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

STUDY
• Study of joints in door panels, wooden furniture
• Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICE
• Basic household wiring using switches, fuse, indicator – lamp etc.,
• Preparation of wiring diagrams
• Stair case light wiring
• Tube – light wiring
• Study of iron-box, fan with regulator, emergency lamp
3. MECHANICAL ENGINEERING PRACTICE

WELDING
- Arc welding of butt joints, lap joints, tee joints
- Gas welding Practice.
- Basic Machining
- Simple turning, drilling and tapping operations.
- Machine assembly Practice.
- Study and assembling the following:
  - Centrifugal pump, mixies and air conditioners.
- Demonstration on
  (a) Smithy operations like the production of hexagonal bolt.
  (b) Foundry operation like mould preparation for grooved pulley.

4. ELECTRONIC ENGINEERING PRACTICE

- Soldering simple electronic circuits and checking continuity.
- Assembling electronic components on a small PCB and testing.
- Study of Telephone, FM radio, low-voltage power supplies.

TOTAL: 45 PERIODS

OUTCOMES:
- ability to fabricate carpentry components and pipe connections including plumbing works.
- ability to use welding equipments to join the structures.
- ability to fabricate electrical and electronics circuits.
OBJECTIVES:
To make the students acquire listening and speaking skills meant for both formal and informal contexts.
• To help them develop their reading skills by exposing them to different types of reading strategies
• To equip them with writing skills needed for academic as well as workplace situations
• To make them acquire language skills at their own pace by using e-materials and language lab component

UNIT I
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on something, weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using ‘emoticons’ as symbols in email messages; Grammar - Regular & irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. ‘can’) - Homophones (e.g. ‘some’, ‘sum’); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II
Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his success, thanking one’s friend / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercise on Grammar and vocabulary, Extensive reading activity (reading stories / novels from links), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students’ dialogues.
UNIT III

Listening - Listening to the conversation - Understanding the structure of conversations; Speaking- Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret etc.); Reading - Speed reading – reading passages with the time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading the articles from the journals - Format for the journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. ‘rock’, ‘train’, ‘ring’); E-materials - Interactive exercise on Grammar & vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU materials – Attending a meeting and writing minutes.

UNIT IV

Listening - Listening to a telephone conversation, Viewing a model interview (face-to-face, telephonic and video conferencing) and observing the practices; Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping the interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar & Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

UNIT V

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading Writing - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises - Pictures for discussion; Language Lab - Different models of group discussion

TOTAL: 60 PERIODS
OUTCOMES:
Learners should be able to

- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

TEXT BOOKS

REFERENCE BOOKS

EXTENSIVE READERS

WEB RESOURCES
1. www.esl-lab.com
2. www.englishgrammar.org
3. www.englishclub.com
4. www.mindtools.com
5. www.esl.about.com
OBJECTIVES

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated

UNIT I  DIFFERENTIAL EQUATIONS  9+3
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients

UNIT II  VECTOR CALCULUS  9+3
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals

UNIT III  ANALYTIC FUNCTION  9+3
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions w = z+c, az, 1/z, z² – Bilinear transformation.

UNIT IV  COMPLEX INTEGRATION  9+3
Line integral - Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s and Laurent’s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis
UNIT V  LAPLACE TRANSFORMS

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem — Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients

TOTAL: 60 PERIODS

OUTCOMES:

- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:


REFERENCES:


PH8252  PHYSICS FOR ELECTRONICS ENGINEERING  L T P C
(Common to ECE, EEE and E& I Branches)  3 0 0 3

OBJECTIVES:

- To illustrate, with suitable examples, the concepts of conductors, semiconductors, dielectric, magnetic and superconducting materials.
- To make the students familiarize with the optical properties of materials.
- To introduce the essential principles of physics for electronics and communication engineering applications.
UNIT I  ELECTRICAL PROPERTIES OF METALS

UNIT II  SEMICONDUCTORS

UNIT III  DIELECTRIC MATERIALS AND INSULATION
Matter polarization and relative permittivity: definition - dipole moment and polarization vector P-polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization - frequency dependence - local field and Clausius-Mossetti equation - dielectric constant and dielectric loss - Gauss’s law and boundary conditions - dielectric strength and insulation break-down in gases, liquids and solids - capacitor materials - typical capacitor constructions - piezoelectricity, ferroelectricity and pyroelectricity - quartz oscillators and filters - piezo and pyroelectric crystals.

UNIT IV  MAGNETIC PROPERTIES AND SUPERCONDUCTIVITY

UNIT V  OPTICAL PROPERTIES OF MATERIALS
Light waves in a homogeneous medium - refractive index - dispersion: refractive index-wave-length behaviour - group velocity and group index - Fresnel’s equations: amplitude, reflection and transmission coefficients, intensity, reflectance and transmittance - complex refractive
index and light absorption - Luminescence, phosphors and white LEDs - polarization - optical anisotropy: uniaxial crystals, birefringence, dichroism - electro-optic effect and amplitude modulators.

**TOTAL : 45 PERIODS**

**OUTCOMES:**
The student will be able to
- apply the electrical properties of matter while understanding the relevant electrical phenomenon.
- apply the concepts of semiconductors and understand the working principle of all types of semiconductor devices.
- apply the concepts of dielectric materials and magnetic properties and understand the electrostatic, electromagnetic, electromechanical behavior of equipments.
- apply the optical properties of materials and understand the electro optic effects.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
AIM:
To impart knowledge in the Applied Chemistry topics relevant to electrical and electronics engineering.

OBJECTIVES:
- To know about the electrochemistry and it is applications.
- To understand the basic concepts about the batteries.
- Importance of Conductivity in Solids and specialty polymers.
- Treatment of water for domestic and industrial purpose.
- Familiarize with various type of material analysis.

UNIT I  ELECTROCHEMISTRY

UNIT II  ENERGY SOURCES

UNIT III  CONDUCTIVITY IN SOLIDS AND SPECIALTY POLYMERS
Electrical properties of solids- band theory of solids- types of energy bands- application of
band theory to solids- semiconductors- types-n and p types- super conductors. Classification of insulating materials based on function and physical state- thermal insulators- optical fibers- organic electronic materials- fullerenes. Introduction to thermoplastics and thermosetting plastics- phenolic and epoxy resins, silicone polymers, rubbers; polyelectrolytes, electrically conducting polymers, polymers with piezoelectric, pyroelectric and ferroelectric properties, photonic polymers, photo resists, basics of LCD and LED.

UNIT IV WATER CHEMISTRY 9
Boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation-external treatment (ion exchange method) - internal treatment-(phosphate, calgon, carbonate, colloidal)-boiler compounds-caustic embrittlement-boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

UNIT V ANALYSIS OF MATERIALS 9

TOTAL : 45 PERIODS

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

TEXT BOOKS

REFERENCE BOOKS
OBJECTIVES

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering

UNIT I BASICS AND STATIC OF PARTICLES


UNIT II QUINTIBRUM OF RIGID BODIES

Free body diagram - Types of supports - Action and reaction forces - stable equilibrium - Moments and Couples - Moment of a force about a point and about an axis - Vectorial representation of moments and couples - Scalar components of a moment - Varignon’s theorem - Single equivalent force - Equilibrium of Rigid bodies in two dimensions - Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS

Centroids and centre of mass - Centroids of lines and areas - Rectangular, circular, triangular areas by integration - T section, I section, Angle section, Hollow section by using standard formula - Theorems of Pappus - Area moments of inertia of plane areas - Rectangular, circular, triangular areas by integration - T section, I section, Angle section, Hollow section by using standard formula - Parallel axis theorem and perpendicular axis theorem - Principal moments of inertia of plane areas - Principal axes of inertia - Mass moment of inertia - Mass moment of inertia for prismatic, cylindrical and spherical solids from first principle - Relation to area moments of inertia

UNIT IV DYNAMICS OF PARTICLES

Displacements, Velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton’s laws of motion - Work Energy Equation - Impulse and Momentum - Impact of elastic bodies

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS

Friction force - Laws of sliding friction - equilibrium analysis of simple systems with sliding friction - wedge friction. Rolling resistance - Translation and Rotation of Rigid Bodies - Velocity
and acceleration - General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere

TOTAL: 60 PERIODS

OUTCOMES:
- ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS

REFERENCES

EE8201 ELECTRIC CIRCUIT ANALYSIS

OBJECTIVES
- To familiarize the basic laws, theorems and the methods of analysing electrical circuits.
- To explain the concept of resonance and coupling in electric circuits and parallel resonance.
- To familiarize the analysis of three-phase circuits
• To teach the transient response of circuits with dc and sinusoidal ac input.
• To impart basic knowledge on network analysis using Laplace transforms.

UNIT I  BASIC CIRCUITS ANALYSIS


UNIT II  RESONANCE AND COUPLED CIRCUITS


UNIT III  THREE PHASE CIRCUITS

Three phase balanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced – phasor diagram of voltages and currents

UNIT IV  TRANSIENT RESPONSE IN DC AND AC CIRCUITS

Time domain analysis for first order and second order systems, S - domain network – driving point and transfer impedances and their properties – poles and zeros of network functions – transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V  TWO PORT NETWORKS


L = 45 PERIODS  T = 15 PERIODS  TOTAL = 60 PERIODS

OUTCOMES:
• Students are able to model, analyze and understand the operation of electrical circuits for both ac and dc excitations.

TEXT BOOKS
REFERENCES

ME8253 POWER PLANT ENGINEERING LTPC 3003

OBJECTIVES:
• 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 10

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 10

UNIT III NUCLEAR POWER PLANTS 7

UNIT IV POWER FROM RENEWABLE ENERGY 10
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

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:

- Able to understand different types of power plant, and its functions and their flow lines and
  issues related to them.
- Analyse and solve energy and economic related issues in power sectors.

TEXT BOOK


REFERENCES

3. Standard Handbook of Power Plant Engineering, Thomas C. Elliott, Kao Chen and
4. Renewable energy, Godfrey Boyle, Open University, Oxford University Press in
   association with the Open University, 2004.

EE8211  ELECTRIC CIRCUITS LABORATORY

OBJECTIVES:

- To impart hands on experience to understand the various electric circuit laws
  and theorems

LIST OF EXPERIMENTS

1. Experimental verification of Kirchhoff’s voltage and current laws
2. Experimental verification of network theorems (Thevenin, Norton, Superposition and
   maximum power transfer Theorem).
3. Study of CRO and measurement of sinusoidal voltage, frequency and power factor.
4. Experimental determination of time constant of series R-C electric circuits.
5. Experimental determination of frequency response of RLC circuits.
6. Design and Simulation of series resonance circuit.
7. Design and Simulation of parallel resonant circuits.
8. Simulation of low pass and high pass passive filters.
10. Experimental determination of power in three phase circuits by two-watt meter method.
11. Calibration of single phase energy meter.
12. Determination of two port network parameters.

**TOTAL : 45 PERIODS**

**LABORATORY REQUIREMENTS FOR 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. Circuit Simulation Software (5 Users) (Pspice / Matlab /other Equivalent software Package) with PC (5 Nos.) 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 Each - 6 Nos.
10. Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)

**OUTCOMES :**

- Students are exposed to experimental knowledge on analysing the electric circuits.
OBJECTIVES

• To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
• 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 transform techniques used in wide variety of situations in which the functions used are not periodic;
• To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I    PARTIAL DIFFERENTIAL EQUATIONS  9+3
Formation - Solutions of first order equations - Standard types and Equations reducible to standard types - Singular solutions - Lagrange’s Linear equation - Integral surface passing through a given curve - Classification of Partial Differential Equations- Solution of linear equations of higher order with constant coefficients - Linear non-homogeneous PDE

UNIT II    FOURIER SERIES  9+3
Dirichlet’s conditions - General Fourier series - Odd and even functions - Half-range Sine and Cosine series - Complex form of Fourier series - Parseval’s identity -Harmonic Analysis

UNIT III   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION  9+3
Method of separation of Variables - Solutions of one dimensional wave equation and one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates

UNIT IV    FOURIER TRANSFORM  9+3
Fourier integral theorem - Fourier transform pair-Sine and Cosine transforms - Properties - Transform of elementary functions - Convolution theorem - Parseval’s Identity

UNIT V    Z - TRANSFORM AND DIFFERENCE EQUATIONS  9+3
Z-transform - Elementary properties - Inverse Z-transform - Convolution theorem - Initial and Final value theorems - Formation of difference equation - Solution of difference equation using Z-transform

TOTAL:60 PERIODS
OUTCOMES:

- The understanding of 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.

TEXT BOOKS


REFERENCES

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
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 – soil 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
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

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT

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

TEXT BOOKS

REFERENCE BOOKS

EE8301 DIGITAL SYSTEMS

OBJECTIVES:
• To introduce the fundamentals of Digital Circuits, combinational and sequential circuit.
• To study various number systems and to simplify the mathematical expressions using Boolean functions – simple problems.
• To study implementation of combinational circuits
• To study the design of various synchronous and asynchronous circuits.
• To expose the students to various memory devices.
• To introduce digital simulation techniques for development of application oriented logic circuit.

UNIT I NUMBER SYSTEMS ,BOOLEAN ALGEBRA AND COMBINATIONAL CIRCUITS

Number system, error detection, corrections & codes conversions Boolean algebra: De-Morgan’s theorem, switching functions and minimisation using K-maps & Quine McCluskey method.
UNIT II  DESIGN OF COMBINATIONAL CIRCUITS , PROGRAMMABLE LOGIC DEVICES, MEMORY  
Design of adder, subtractor, comparators, codeconverters, encoders, decoders, multiplexers and demultiplexers.
Memories: ROM, PROM, EPROM, PLA, PLD

UNIT III  SYNCHRONOUS SEQUENTIAL CIRCUITS  
Flip flops - SR, D, JK and T, shift registers, counters, state assignments analysis and design of synchronous sequential circuits, state diagram; state reduction.

UNIT IV  ASYNCHRONOUS SEQUENTIAL CIRCUIT  
Analysis of asynchronous sequential machines, state assignment, asynchronous design problem.

UNIT V  LOGIC FAMILIES AND VHDL  

TOTAL : 45 PERIODS

OUTCOMES :
- Various types of digital circuits are analysed and studied
- Knowledge in memory devices and simulation techniques for the development of digital circuits are achieved.

TEXT BOOKS:

EE8302  ELECTROMAGNETIC THEORY  L T P C  3 0 0 3

OBJECTIVES:
To impart knowledge on the concepts and the computation of Electro-magnetic field which is essential for understanding the working principle, design and analysis of Electrical machines and Systems.
UNIT I  INTRODUCTION

Sources and effects of electromagnetic fields – Vector fields – Gradient, Divergence, Curl – theorems and applications.

UNIT II  ELECTROSTATICS

Coulomb’s Law – Electric field intensity – Field due to discrete and continuous charges – Gauss’s law and applications – Electric potential – Electric field and equipotential plots, Uniform & Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectric -Dielectric polarization - Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson’s and Laplace’s equations, Capacitance, Energy density, Applications.

UNIT III  MAGNETOSTATICS

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


UNIT V  ELECTROMAGNETIC WAVES


OUTCOMES:

• Ability to understand Electro-magnetic field theory and apply them to electrical engineering problems.

TEXT BOOKS:


REFERENCES:

EC8304 ELECTRONIC DEVICES AND CIRCUITS L T P C
3 0 0 3

OBJECTIVES:
- To acquaint the students with construction, theory and characteristics of the following electronic devices. P-N junction diode, Bipolar transistor, Field Effect transistor, LED, LCD and other photo electronic devices, Power control/regulator devices, Feedback amplifiers and oscillators

UNIT I PN JUNCTION DEVICES

UNIT II BIPOLAR JUNCTION AND FIELD EFFECT TRANSISTORS
BJT – structure, operation and V-I characteristic – JFET – structure, operation and V-I characteristic, CURRENT Equation, MOSFET – structure, operation and V-I characteristic – types of MOSFET

UNIT III AMPLIFIERS
UNIT IV  MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER  
BIMOS cascade amplifier, differential amplifier – common mode and difference mode analysis – tuned amplifiers – single tuned amplifiers – gain and frequency response

UNIT V  FEEDBACK AMPLIFIERS AND OSCILLATORS  
Advantages of negative feedback – voltage / current, series, shunt feedback – positive feedback – condition for oscillations, phase shift – Wien bridge, Hartley, colpitts and crystal oscillators

TOTAL: 45 PERIODS

OUTCOMES:

- Able to explain the structure of the basic electronic devices.
- Able to design applications using the basic electronic devices.

TEXT BOOKS:


REFERENCES:


EE8304  LINEAR INTEGRATED CIRCUITS  
L T P C  3 0 0 3

OBJECTIVES

- To study the IC fabrication procedure.
- To analyse circuit characteristics with signal analysis using Op-amp ICs.
- To design application circuits with Op-amp.
- To study internal functional blocks and the applications of special ICs like Timers, PLL circuits, regulator ICs, ADCs.
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.

UNIT II  CHARACTERISTICS OF OPAMP
Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current: voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – summer, differentiator and integrator.

UNIT III  APPLICATIONS OF OPAMP
Instrumentation amplifier, first and second order active filters, V/I & I/V converters, comparators, multivibrators, waveform generators, clippers, clamps, peak detector, S/H circuit, D/A converter (R-2R ladder and weighted resistor types), A/D converter - Dual slope, successive approximation and flash types, Sigma- Delta ADC.

UNIT IV  SPECIAL ICS
555 Timer circuit – Functional block, characteristics & applications; 566-voltage controlled oscillator circuit; 565-phase lock loop circuit functioning and applications, Analog multiplier ICs.

UNIT V  APPLICATION ICS
IC voltage regulators - LM317, 723 regulators, switching regulator, MA 7840, LM 380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, opto coupler, opto electronic ICs.

TOTAL: 45 PERIODS

OUTCOMES:
• Ability to analyse comprehend and design analog electronic circuits involving linear ICs.

TEXT BOOKS:

REFERENCES:
EE8311 ELECTROMAGNETIC FIELD LABORATORY

OBJECTIVES:
- To learn graphical representation of fields (using Mathematical Development Tool) and Electromagnetic Field Computation using FEM packages.

LIST OF EXPERIMENTS:

Graphical Representation of fields (using Mathematical Development Tool)
1. Plotting of vector, divergence and curl fields
2. Plotting of electric field and equipotential lines
3. Plotting of Magnetic fields

Field Computation:

Computation of Electric (E) and Magnetic (H) fields (using FEM/FDM packages) for simple configurations
5. Computation of Electric field intensity, voltage distribution and capacitance
6. Computation of Magnetic field intensity and inductance
7. Calculation of Skin depth

Measurement using field meter
8. Measurement of Electric Fields (E)
9. Measurement of Magnetic fields (H)
10. Measurement of E and H around practical appliances

TOTAL: 45 PERIODS

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS:
1. 15 computers with FEM and Mathematical Development Tool packages
2. Electromagnetic field meter

OUTCOMES:
- Ability to compute Electric (E) and Magnetic (H) fields and to measure the same using field meter
OBJECTIVES:
• To obtain the characteristics of electronic devices and amplifier circuits
• To simulate electronic circuits using standard software packages

LIST OF EXPERIMENTS
1. PN Junction and Zener diode V-I Characteristics
2. Line and load regulation in Zener regulator
3. Common Emitter characteristics
4. JFET – characteristics and parameter determination
5. CE Amplifier frequency response
6. Common Source amplifier
7. Wien bridge oscillator
8. Characteristics of Differential amplifier

TOTAL: 45 PERIODS

OUTCOMES:
• Operating principles, characteristics of semiconductor devices are studied, simulated and verified.
• Features of amplifiers and oscillators are verified.
OBJECTIVES:

- To introduce the concepts of communication systems engineering using wire and wireless medium
- To introduce different methods of analog communication and their significance
- To introduce Digital Communication methods for high bit rate transmission
- To introduce the concepts of source and line coding techniques for enhancing rating of transmission of minimizing the errors in transmission.
- To introduce optical and cellular communication concepts

UNIT I   ANALOG COMMUNICATION   9
AM - Frequency spectrum - vector representation - power relations - generation of AM - DSB, DSB/SC, SSB, VSB, AM Transmitter & Receiver; FM and PM - frequency spectrum - power relations : NBFM & WBFM, Generation of FM and PM - Amstrong method & Reactance modulators

UNIT II   DIGITAL COMMUNICATION   9
Pulse modulations - concepts of sampling and sampling theorem, quantization and coding : PCM, DM, slope overload error. ADM. DPCM, PAM, Digital modulation techniques - ASK, FSK, PSK, BPSK, QPSK

UNIT III   SOURCE CODES, LINE CODES & ERROR CONTROL   9
Binary communication -entropy, properties, BSC, BEC, noiseless coding theorem, BW- SNR trade off, source coding : Shannon-Fano, Huffman coding -, Line codes: NRZ, RZ, AMI, HDBP, ARQ, mBnB codes, PSD - error control codes and applications: block, cyclic and convolution codes

UNIT IV   MULTIPLE ACCESS TECHNIQUES   9
Spread Spectrum & Multiple Access techniques : FDMA, TDMA, CDMA concepts, advantages and applications

UNIT V   OPTICAL AND CELLULAR COMMUNICATIONS   9
Fibers - types: sources, detectors, optical link, Cellular concept - Frequency reuse - channel assignment strategies - handoff strategies - Interference and system capacity - Coverage and capacity expansion techniques

TOTAL:45 PERIODS
OUTCOMES
- Basic theories behind the various communication systems are studied.
- Features of the various communication systems are studied.

TEXT BOOKS

REFERENCES
4. B.P.Lathi “Modern digital and analog communication systems” Oxford University Press, 2010

EE8402 DIGITAL SIGNAL PROCESSING L T P C 3 0 0 3

OBJECTIVES:
- To introduce the concept of analyzing discrete time signals & systems in the time and frequency domain.
- To classify signals and systems & their mathematical representation.
- To analyse the discrete time systems.
- To study various transformation techniques & their computation.
- To study about filters and their design for digital implementation.
- To study about a programmable digital signal processor & quantization effects.

UNIT I INTRODUCTION 9
Classification of systems: Continuous, discrete, linear, causal, stable, 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. Digital signal representation.
UNIT II  DISCRETE TIME SYSTEM ANALYSIS  
Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Introduction to Fourier Transform– Discrete time Fourier transform.

UNIT III  DISCRETE FOURIER TRANSFORM & COMPUTATION  

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

UNIT V  DIGITAL SIGNAL PROCESSORS  
Introduction – Architecture of one DSP processor– Features – Addressing Formats – Functional modes - Introduction to Commercial Processors

OUTCOMES:
• Ability to understand and apply Fourier transforms for processing of signals
• Ability to design and develop digital filters algorithms in digital signal processor platforms.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To study the fundamental principles of Magnetic Circuits, Electro-mechanical energy conversion.
- To study the machine windings and the MMF curves of armature and field windings.
- To derive the EMF and torque equations of rotating machines.
- To study the theory, operation and complete steady state behaviour of DC machines and Transformers.

UNIT I MAGNETIC CIRCUITS AND MAGNETIC MATERIALS 6
Ampere’s circuit law, i-H and B-H relations – Flux linkage, inductance and energy – Magnetization curve, hysteresis loss and eddy current loss – Sinusoidal excitation and Exciting current – Magnetization and design of Permanent magnet and its materials.

UNIT II ELECTRO-MECHANICAL ENERGY CONVERSION 6

UNIT III BASIC CONCEPTS IN ELECTRICAL MACHINES 9

UNIT IV D.C. MACHINES 12

UNIT V TRANSFORMERS 12
OUTCOMES:

- Fundamental concepts of magnetic circuits and energy conversion are studied.
- MMF curves for field and armature windings is realised.
- Generalised form of EMF and Torque equations are obtained.
- Performance characteristics of DC machines and transformers are obtained.

TEXT BOOKS:


REFERENCES:


EE8404 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION L T P C

3 0 0 3

OBJECTIVES

To enable the student to have a clear knowledge of the basic laws governing the operation of the instruments, relevant circuits and their working:
- To introduce the general instrument system, error, calibration etc.
- To explain the techniques for measurement of voltage and current.
- To explain the techniques for measurement of other electrical parameters namely power, energy, frequency, phase etc.
- To discuss the comparison methods of measurement.
- To give exposure to non-electrical measurements and data acquisition system.

UNIT I MEASUREMENT SYSTEMS

Measurement: significance, methods – Instruments: classification, applications – Elements of a generalized measurement system - Static and dynamic characteristics - Errors in measurement - Probable error - Limiting error - Statistical evaluation of measurement data - Gaussian distribution - Standards and calibration
UNIT II  MEASUREMENT OF VOLTAGE AND CURRENT

UNIT III  MEASUREMENT OF OTHER ELECTRICAL PARAMETERS
Single and three phase wattmeter and energy meter – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Measurement of frequency and phase - Instrument transformers – CRT and CRO – DSO

UNIT IV COMPARISON METHODS OF MEASUREMENTS
D.C. potentiometer: basic circuit, standard, laboratory (Crompton) type – A.C. potentiometer: polar (Drysdale) type and coordinate (Gall-Tinsley) type - Measurement of low, medium and high resistance: ammeter-voltmeter method, wheatstone bridge, Kelvin double bridge - A.C. bridge: Maxwell, Hay, Wien and Schering – Errors and compensation in A.C. bridges - Multiple earth and earth loops – Grounding techniques - Electrostatic and electromagnetic interference

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS

TOTAL: 45 PERIODS

OUTCOMES:
• Ability to implement and verify different measurement schemes for measuring of electrical and non electrical parameters.

TEXT BOOKS:

REFERENCE BOOKS:

EE8405 MICROPROCESSORS AND MICROCONTROLLERS L T P C

3 0 0 3

OBJECTIVES:
• To study the Architecture of 8085, 8086 & 8051.
• To study the addressing modes & instruction set of 8085 & 8051 and to develop skills in simple program writing.
• To introduce commonly used peripheral/ interfacing ICs.
• To study and understand typical applications of micro-processors
• To study and understand the typical applications of micro-controllers.

UNIT I 8085 & 8086 PROCESSOR 9

UNIT II PROGRAMMING OF 8085 PROCESSOR 9
Instruction format and addressing modes – Assembly language format – Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing - Look up table - Subroutine instructions, stack.

UNIT III PERIPHERAL INTERFACING 9
Study of Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8251 USART, 8279 Key board display controller and 8254 Timer/ Counter – Interfacing with 8085 - A/D and D/A converter interfacing.

UNIT IV MICRO CONTROLLER 8051 9

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9
Data Transfer, Manipulation, Control & I/O instructions – Simple programming exercises - key board and display interface – Temperature control system - stepper motor control.
OUTCOMES:
- Ability to analyse, comprehend, design and simulate microprocessor and microcontroller based systems used for control and monitoring.

TEXT BOOKS:

REFERENCES:

EE8406 TRANSMISSION AND DISTRIBUTION

OBJECTIVES
- To impart knowledge about the configuration of the electrical power system
- To analyze and model different components of power system

UNIT I STRUCTURE OF POWER SYSTEM
Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors – distributed and concentrated loads – interconnection – EHVAC and HVDC transmission - Introduction to FACTS.

UNIT II TRANSMISSION LINE PARAMETERS
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 - interference with neighboring communication circuits - Typical configurations, conductor types and electrical parameters of 765 kV, 400 kV, 220 kV, 110 kV, 66 kV and 33 kV lines, corona discharges.
UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES

Classification of 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, surge impedance loading, methods of voltage control; Ferranti effect.

UNIT IV INSULATORS AND CABLES


UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING

Mechanical design of transmission line – sag and tension calculations for different weather conditions, Tower spotting, Types of towers, Substation Layout (AIS, GIS), Methods of grounding.

OUTCOMES:

- Ability to understand transmission line models, insulations design and distribution schemes.

TOTAL : 45 PERIODS

TEXT BOOKS:


REFERENCES:

OBJECTIVES

- To study the load characteristics of DC machines and transformers.
- To determine the performance characteristics of DC machines and transformers using direct and indirect tests.
- To study the different speed control methods of DC shunt motor.
- To study the need for starters in DC motors.
- To study the various connections in three phase transformers.

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of a separately excited DC Generator
2. Open circuit and load characteristics of DC shunt Generator
3. Speed control of DC shunt motor.
4. Load test on DC shunt motor.
5. Load test on DC series motor.
6. Load test of DC compound motor
7. Swinburne’s test.
8. Hopkinson’s Test.
10. Separation of no load losses in a single phase transformer.
11. Sumpner’s test

LABORATORY REQUIREMENTS FOR 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
15. SPST switch – 2 nos

TOTAL: 45 PERIODS

OUTCOMES:
- Complete performance characteristics of DC machines and transformers are obtained.
- Speed control of DC shunt motor above and below rated speed is studied.
- DC motor starters and Three phase transformer connections are studied.

EE8412 INTEGRATED CIRCUITS AND MICROCONTROLLER LTPC
LABORATORY 0 0 3 2

OBJECTIVES:
- To develop an in-depth understanding of the operation of microprocessors and microcontrollers
- To program microprocessor/microcontroller using assembly languages
- To understand the standard microprocessor/microcontroller interfaces
- To design combinational logic circuits using digital IC’s
- To analyze and design various applications of Op-Amp

LIST OF EXPERIMENTS
1. Simple arithmetic operations: Multi precision addition / subtraction / multiplication / division.
3. Interface Experiments:
   - A/D Interfacing.
   - D/A Interfacing.
   - Traffic light controller.
4. Interface Experiments:
   - Simple experiments using 8251, 8279, 8254.
5. Demonstration of basic instructions with 8051 Micro controller execution, including:
   - Conditional jumps, looping
   - Calling subroutines.
   - Stack parameter testing

6. Parallel port programming with 8051 using port 1 facility:
   - Stepper motor and D / A converter.


9. Sequential Logic: Study of Flip-Flop, Counters (synchronous and asynchronous), Shift Registers

    Op-amp Non Linear Application: Clipper, Clamper, Peak detector,

11. Timer IC application, astable multi-vibrator and VCO circuit.

**LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS**

1. 8085 – Microprocessor student trainer kit – 15 nos
2. 8051 – Micro controller student trainer kit – 15 nos
3. DAC, ADC interface cards – 5 nos
4. Traffic light controller interface board – 5 nos
5. Stepper motor drive interface – 5 sets
6. Keypad – display interface card – 5 nos
7. Oscilloscope (CRO) – 5 nos
8. Regulated Power supply ± 12V, 0.5A and +5V, 2A along with Bread – board and analog digital IC, as per the above list – 5 sets

**TOTAL : 45 PERIODS**

**OUTCOMES:**
The students are able to
- understand and apply the fundamentals of assembly level programming of microprocessors/ microcontrollers
- work with standard microprocessor/ microcontroller interfaces implement real-time systems
- design and conduct experiments using digital IC’s and Op-Amp
OBJECTIVES
The objective of this course is to emphasize the importance of control and empower the students with basic concepts on modeling, analysis and design of control systems restricted to linear continuous time system. The specific objectives of each unit are

- To introduce the classical way of modeling systems, commonly used control components and their mathematical models from physical laws
- To introduce the time domain analysis of transfer function models and understand the concepts of poles, zeros and movement of poles under feedback
- To introduce the various graphical methods available to analyze and assess systems in frequency domain
- To impart knowledge in the modern state variable approach, closed form solution methods and analyzing system properties
- To educate on drawing of specification, choosing of control structures and methods of designing the controllers

UNIT I INTRODUCTION
Control system - Basic components - Open and closed Loop - Effect of feedback - System representations - Transfer functions of single input & single output and multivariable systems – Block diagrams – Signal flow graphs – Gain formula – Modeling of control components – Mechanical and electrical systems

UNIT II TRANSFER FUNCTION MODEL AND ANALYSIS

UNIT III FREQUENCY DOMAIN ANALYSIS

UNIT IV STATE VARIABLE MODEL AND ANALYSIS
UNIT V  DESIGN OF CONTROL SYSTEMS


TOTAL : 45 PERIODS

OUTCOMES:
- Ability to analyse systems using transfer function and state space models
- Ability to design controllers and compensators using conventional techniques

TEXTBOOKS

REFERENCES
OBJECTIVES
To impart knowledge on
- Theory and performance of salient and non-salient pole synchronous generators.
- Principle of operation and performance of synchronous motor.
- Principle of operation and performance of induction motor and generator.
- Starting and speed control of three-phase induction motors.
- Principle of operation and performance of single phase induction motors and special machines.

UNIT I  SYNCHRONOUS GENERATOR

UNIT II  SYNCHRONOUS MOTOR

UNIT III  INDUCTION MACHINE: THEORY

UNIT IV  INDUCTION MACHINE: PERFORMANCE
No-load and Blocked rotor tests, equivalent circuit and circle diagram – losses and efficiency – starting methods – Speed control methods, temperature rise and insulation – energy efficient motors.

UNIT V  SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES

**TOTAL : 45 PERIODS**

**OUTCOMES:**
- Steady state performance analysis of three-phase alternator, three-phase induction machines are studied.
- Predetermination of voltage regulation of salient and non-salient pole generators is done.
- V-curves and inverted V-curves of alternator is studied.
- Various starting and speed control methods of three-phase induction motor are studied.
- Principle of operation of single-phase induction motor and special machines are studied.

**TEXT BOOKS:**

**REFERENCES:**

**EE8503 POWER ELECTRONICS  L T P C**

**OBJECTIVES:**
To understand the various applications of electronic devices for conversion, control and conditioning of the electrical power.
- To get an overview of different types of power semiconductor devices and their dynamic characteristics.
- To understand the operation, characteristics and performance parameters of controlled rectifiers.
- To study the operation, switching techniques and basics topologies of DC-DC switching regulators.
- To learn the different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
• To study the operation of AC voltage controller and various configurations of AC voltage controller.

UNIT I  UNCONTROLLED RECTIFIERS  9

UNIT II  CONTROLLED RECTIFIERS  9

UNIT III  SWITCHING POWER SUPPLIES  9
SCR based step-down & step-up choppers - MOSFET dynamic behavior , Driver & snubber circuits; Low power high switching frequency switching Power supplies , Buck, Boost ,Buck- Boost, converters – Isolated topologies – Resonant converters - switching loss calculations & thermal design.

UNIT IV  INVERTERS  9
IGBT - Static dynamic behavior , 1 Φ half bridge and full bridge inverters SCR based six step 3 Φ VSI. SCR based ASCI, PWM (both unipolar & Bipolar) – Third harmonic injected sine pwm - space vector PWM – selective harmonic elimination.

UNIT V  AC PHASE CONTROLLERS  9
TRIAC triggering concept with positive gate pulse & negative gate pulse triggering, TRIAC based phase controllers, SCR based 1 Φ & 3 Φ ac phase controller ; various configurations.

L = 45 PERIODS, T = 15 PERIODS, TOTAL : 60 PERIODS

OUTCOMES:
• Ability to simulate and design different power converters and also to implement and verify the performance specifications of power converters.

TEXT BOOKS:
REFERENCES:

EE8504 POWER SYSTEM ANALYSIS L T P C 3 1 0 4

OBJECTIVES
- To model and analyze the power system under steady state operating condition.
- To apply numerical methods to solve the power flow problem.
- To model and analyze the system under balanced and unbalanced conditions.
- To model and analyze the stability of power system when it is subjected to a fault.

UNIT I INTRODUCTION 12
Need for system planning and operational studies – basic components of a power system.- Introduction to restructuring - Single line diagram – per phase and per unit analysis – Generator - transformer – transmission line and load representation for different power system studies.- Primitive network - construction of Y-bus using inspection and singular transformation methods – z-bus.

UNIT II POWER FLOW ANALYSIS 12

UNIT III FAULT ANALYSIS – BALANCED FAULTS 12
UNIT IV  FAULT ANALYSIS – UNBALANCED FAULTS  12
Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines - sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin’s theorem and Z-bus matrix

UNIT V  STABILITY ANALYSIS  12
Importance of stability analysis in power system planning and operation - classification of power system stability - angle and voltage stability – Single Machine Infinite Bus (SMIB) system: Development of swing equation - equal area criterion - determination of critical clearing angle and time – solution of swing equation by modified Euler method and Runge-Kutta fourth order method

OUTCOMES:
• The students are equipped with power flow, short-circuit and transient stability studies that are useful for transmission expansion planning and day-to-day operation of power system.

TEXT BOOKS

REFERENCES
LIST OF EXPERIMENTS

CONTROL SYSTEMS:
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
11. Signal Conditioning
    a. Instrumentation Amplifier
    b. Analog – Digital and Digital – Analog converters (ADC and DACs)

REQUIREMENT FOR A BATCH OF 30 STUDENTS

CONTROL SYSTEMS:
1. PID kit – 1 No.
   DSO – 1 No.
   CRO Probe – 2 nos
2. Personal computers
3. DC motor – 1 No.
   Generator – 1 No.
   Rheostats – 2 nos
   Ammeters
Volmeters
Connecting wires (3/20)

4. CRO 30MHz – 1 No.
   2MHz Function Generator – 1No.

5. Position Control Systems Kit (with manual) – 1 No.,
   Tacho Generator Coupling set

6. AC Synchro transmter & receiver – 1No.
   Digital multimeters

**INSTRUMENTATION:**

7. R, L, C Bridge kit (with manual)

8. a) Electric heater – 1No.
   Thermometer – 1No.
   Thermistor (silicon type)
   RTD nickel type – 1No.
   
   b) 30 psi Pressure chamber (complete set) – 1No.
   Current generator (0 – 20mA)
   Air foot pump – 1 No. (with necessary connecting tubes)
   
   c) LVDT 20mm core length movable type – 1No.
   CRO 30MHz – 1No.
   
   d) Optical sensor – 1 No.
   Light source
   
   e) Strain Gauge Kit with Handy lever beam – 1No.
   100gm weights – 10 nos
   
   f) Flow measurement Trainer kit – 1 No.
   (1/2 HP Motor, Water tank, Digital Milliammeter, complete set)

   Watthour meter (energy meter) – 1No.
   Ammeter
   Voltmeter
   Rheostat
   Stop watch
   Connecting wires (3/20)

10. IC Transistor kit – 1No.

**TOTAL : 45 PERIODS**

**OUTCOMES:**
- Will be able to understand and apply basic science, circuit theory, theory control
  theory signal processing and apply them to electrical engineering problems.
OBJECTIVES

- To study the performance characteristics of induction motors and synchronous induction motor.
- To study the predetermination of voltage regulation of synchronous generator.
- To study the variation in reluctance in salient pole machine.
- To predetermine the characteristics of single phase and three phase induction motors.

LIST OF EXPERIMENTS

2. Slip test and determination of $X_d$ and $X_q$.
4. Load test on three phase induction motor.
5. Load test on single phase induction motor.
10. Load characteristics of induction generator.

LABORATORY REQUIREMENTS FOR 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. BLDC Motor – 1 No.
8. Single Phase Auto Transformer – 2 nos
9. Three Phase Auto Transformer – 3 nos
10. Single Phase Resistive Loading Bank – 2 nos
11. Three Phase Resistive Loading Bank – 2 nos
13. SPST switch – 2 nos

TOTAL : 45 PERIODS

OUTCOMES:
- Characteristics of induction and synchronous machines are studied using direct and in direct methods.
- Regulation of three phase alternator is predetermined using optimistic, pessimistic and accurate method are done.
- Saliency nature of synchronous machine is studied.
- Performance of single-phase induction motor is obtained.

EE8513 POWER ELECTRONICS LABORATORY

OBJECTIVES:
- To study, analyse the performance of different power electronic converter circuits.
- To simulate different power electronic converter circuits and analyse their performance

LIST OF EXPERIMENTS
1. Characteristics of SCR and Triac
2. Characteristics of MOSFET and IGBT
3. AC to DC half controlled converter
4. AC to DC fully controlled Converter
5. Step down and step up MOSFET based choppers
6. IGBT based single phase PWM inverter
7. IGBT based three phase PWM inverter
8. AC Voltage controller
9. Switched mode power converter.
10. Simulation of PE circuits (1Φ & 3Φ semi converter, 1Φ & 3Φ full converter, dc-dc converters, ac voltage controllers).

TOTAL: 45 PERIODS
REQUIREMENT FOR A BATCH OF 30 STUDENTS

1. Device characteristics (for SCR, MOSFET, TRIAC and IGBT kit with built in power supply and meters) - 2 each
2. Single phase SCR based half controlled converter and fully controlled converter along with built-in/separate/firing circuit/module and meter – 2 each
3. MOSFET based step up and step down choppers – 1 each
4. IGBT based single phase PWM inverter module – 2
5. IGBT based three phase PWM inverter module – 2
6. Switched mode power converter module – 2
7. SCR & TRIAC based 1 phase AC controller along with lamp or rheostat load - 2
8. Cyclo converter kit with firing module – 2
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 tables – 10
18. DC and AC meters of required ranges - 20

OUTCOMES:

- Ability to construct test platforms and analyse power electronic circuits.

MG8653 PRINCIPLES OF MANAGEMENT

OBJECTIVES:

- To study the Evolution of Management
- To study the functions and principles of management
- 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 able 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:
2. JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, Pearson Education, 6th
REFERENCES:

EE8601 HIGH VOLTAGE ENGINEERING L T P C
3 0 0 3

OBJECTIVES
- To impart knowledge about causes, effects of over voltages, dielectric breakdown mechanism and to emphasis the need for generation, measurement and testing of High voltages and currents.

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9
Causes of over voltages and its effects on power system – Lightning, switching surges and temporary overvoltages – Reflection and Refraction of Travelling waves- Protection against overvoltages.

UNIT II DIELECTRIC BREAKDOWN 9
Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids, Maintenance of oil Quality – Breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9
Generation of High DC, AC, impulse voltages and currents - Triggering and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9
UNIT V  HIGH VOLTAGE TESTING & INSULATION COORDINATION

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.

TOTAL : 45 PERIODS

OUTCOMES:
• Ability to analyze the different electrical stress in a Power System and design & develop appropriate insulation schemes

TEXT BOOKS

REFERENCES

EE8602  POWER SYSTEM OPERATION AND CONTROL  L T P C  3 0 0 3

OBJECTIVES
To have an overview of power system operation and control,
• to model power-frequency dynamics and to design power-frequency controller.
• to model reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
• to study the economic operation of power system.
• to teach about SCADA and its application for real time operation and control of power systems.

UNIT I  INTRODUCTION
An overview of power system operation and control - system load variation - load characteristics
- load curves and load-duration curve - load factor - diversity factor - Importance of load forecasting and quadratic and exponential curve fitting techniques of forecasting – plant level and system level controls.

UNIT II REAL POWER - FREQUENCY CONTROL
Basics of speed governing mechanism and modeling - speed-load characteristics – load sharing between two synchronous machines in parallel - control area concept - LFC control of a single-area system - static and dynamic analysis of uncontrolled and controlled cases - two-area system – modeling - static analysis of uncontrolled case - tie line with frequency bias control - state variable 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 - excitation systems – modeling - static and dynamic analysis - stability compensation - methods of voltage control: tap-changing transformer, SVC (TCR + TSC) and STATCOM – secondary voltage control.

UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH

UNIT V COMPUTER CONTROL OF POWER SYSTEMS
Need for computer control of power systems - concept of energy control centre - functions - system monitoring - data acquisition and control - system hardware configuration – SCADA and EMS functions - network topology - state estimation – WLSE - Contingency Analysis - state transition diagram showing various state transitions and control strategies.

OUTCOMES:
• Ability to understand and analyse power system operation, stability, control and protection.

TEXT BOOKS
REFERENCES

HS8561 EMPLOYABILITY SKILLS
(Lab / Practical Course) 0 0 2 1
(Common to all branches of Fifth or Sixth Semester B.E / B.Tech programmes)

OBJECTIVES
• To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
• To help them improve their soft skills, including report writing, necessary for the workplace situations
  2. Creating effective PPTs – presenting the visuals effectively
  3. Using appropriate body language in professional contexts – gestures, facial expressions, etc.
  4. Preparing job applications - writing covering letter and résumé
  5. Applying for jobs online - email etiquette
  6. Participating in group discussions – understanding group dynamics - brainstorming the topic
  7. Training in soft skills - persuasive skills – People skills - questioning and clarifying skills – mock GD
  8. Writing Project proposals – collecting, analyzing and interpreting data / drafting the final report
9. Attending job interviews – answering questions confidently
10. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

REQUIREMENTS FOR A CLASS OF 30 STUDENTS

1. A PC or a lap top with one or two speakers
2. A Collar mike and a speaker
3. An LCD projector and a screen
4. CD’s and DVD’s on relevant topics

OUTCOMES:
At the end of the course, learners should be able to
• Take international examination such as IELTS and TOEFL
• Make presentations and Participate in Group Discussions.
• Successfully answer questions in interviews.

REFERENCE BOOKS


EXTENSIVE READERS


WEB RESOURCES

1. www.humanresources.about.com
2. www.careerride.com
OBJECTIVES

- To learn breakdown study of Dielectrics, High Voltage testing of Power Apparatus, generation and measurement of High Voltages

LIST OF EXPERIMENTS

1. Design and Analysis of High voltage generation using Circuit simulation packages.
   - Impulse Generator
   - HVDC Generator
2. Generation and Measurement of High AC voltage
3. Generation and Measurement of High DC voltage
4. Generation and Measurement of High Impulse voltage
5. Breakdown study of Gaseous dielectrics under Uniform and Non-uniform field
6. Breakdown study of Liquid dielectrics under Uniform and Non-uniform field
7. Breakdown study of Solid dielectrics under uniform field
8. Measurement of Capacitance & tan δ
9. Power Frequency voltage withstand test on High voltage power apparatus
10. Impulse voltage withstand test on High voltage power apparatus
11. Measurement of Earth Resistance

TOTAL: 45 PERIODS

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS

1. High AC, DC and Impulse voltage generators with measuring devices
2. Test kits for Breakdown study
3. Capacitance and tan δ bridge
4. Earth resistance kit
5. Harmonic Analyser

OUTCOMES:

- Ability to review, prepare and present technological development in insulation design for High Voltage Power Apparatus
OBJECTIVES
- To study the modeling and parameter estimation of transmissions lines
- To study the various methods used for solving load flow analysis.
- To study the stability, dynamics and transient analysis of power systems.
- To understand the concept of economic dispatch.

LIST OF EXPERIMENTS:
1. Computation of Parameters and Modelling of Transmission Lines
2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks.
5. Fault Analysis
7. Transient Stability Analysis of Multimachine Power Systems
8. Electromagnetic Transients in Power Systems

TOTAL : 45 PERIODS

LABORATORY REQUIREMENT FOR A BATCH OF 30 STUDENTS
1. Personal computers (Pentium-IV, 80GB, 512 MBRAM) – 25 nos
2. Printer laser- 1 No.
3. Dot matrix- 1 No.
4. Server (Pentium IV, 80GB, 1GBRAM) (High Speed Processor) – 1 No.
5. Software: any power system simulation software - 5 licenses

OUTCOMES:
- Ability to develop algorithms to study loan flow, short circuit and stability analysis
OBJECTIVES
To provide sound knowledge about constructional details and design of various electrical machines, in order
• to study magnetic circuit parameters and thermal rating of various types of electrical machines.
• to design armature and field systems for D.C. machines.
• to design core, yoke, windings and cooling systems of transformers.
• to design stator and rotor of induction machines and synchronous machines.
• to introduce the importance of computer aided design method.

UNIT I INTRODUCTION

UNIT II DC MACHINES

UNIT III TRANSFORMERS

UNIT IV INDUCTION MOTORS

UNIT V SYNCHRONOUS MACHINES
Output equations – choice of specific loadings – Design of salient pole machines – Short

TOTAL : 60 PERIODS

OUTCOMES:
• Understand basics of design considerations for rotating and static electrical machines
• Ability to model and analyze electrical apparatus and their application to Electrical Engineering.

TEXT BOOKS

REFERENCES

EE8702 PROTECTION AND SWITCHGEAR

OBJECTIVES:
• To discuss about the nature, types and causes of faults in Power System and the construction and operating principle of protective components.

UNIT I PROTECTION SCHEMES
Principles and need for protective schemes – nature and causes of faults – types of faults – fault current calculation using symmetrical components – Methods of Neutral grounding – Zones of protection and essential qualities of protection – Protection schemes

UNIT II ELECTROMAGNETIC RELAYS
Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Overcurrent, 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, busbars and transmission line.
UNIT IV    STATIC RELAYS AND NUMERICAL PROTECTION    9
Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators – Block diagram of Numerical relays – Overcurrent protection, transformer differential protection, distant protection of transmission lines.

UNIT V     CIRCUIT BREAKERS    9

TOTAL : 45 PERIODS

OUTCOMES:
• Acquire the knowledge about the faults in Power System and analyze the design of protective scheme with suitable selection of protective components.

TEXT BOOKS:

REFERENCES:
OBJECTIVES

• To analyze the various concepts behind renewable energy resources.
• To introduce the energy saving concept by different ways of illumination.
• To understand the different methods of electric heating and electric welding.

UNIT I    ELECTRIC DRIVES AND TRACTION

Fundamentals of electric drive - choice of an electric motor - application of motors for particular services - traction motors - characteristic features of traction motor - systems of railway electrification - electric braking - train movement and energy consumption - traction motor control - track equipment and collection gear.

UNIT II    ILLUMINATION

Introduction - definition and meaning of terms used in illumination engineering - classification of light sources - incandescent lamps, sodium vapour lamps, mercury vapour lamps, fluorescent lamps – design of illumination systems - indoor lighting schemes - factory lighting halls - outdoor lighting schemes - flood lighting - street lighting - energy saving lamps, LED.

UNIT III    HEATING AND WELDING


UNIT IV    SOLAR RADIATION AND SOLAR ENERGY COLLECTORS


UNIT V    WIND ENERGY

Introduction - basic principles of wind energy conversion - site selection considerations - basic components of a WECS (Wind Energy Conversion System) - Classification of WECS - types of wind Turbines - analysis of aerodynamic forces acting on the blade - performances of wind.

TOTAL : 45 PERIODS

OUTCOMES:

• Awareness on electrical energy utilization and need for conservation
• Awareness on Renewable energy sources.
TEXT BOOKS


REFERENCES:


EE8711 CREATIV E AND INNOVATIVE PROJECT L T P C
(Activity based – Subject related) 0 0 3 2

OBJECTIVES:
To use the knowledge acquired in Electrical and Electronics Engineering to do a mini project, which allows the students to come up with designs, fabrication or algorithms and programs expressing their ideas in a novel way.

STRATEGY:
To identify a topic of interest in consultation with Faculty/Supervisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carry out the design / fabrication or develop computer code. Demonstrate the novelty of the project through the results and outputs.

OUTCOMES:
- Obtain the skills of conducting literature survey.
- Learn different field problems pertaining to Electrical Engineering and the existing solutions to them.
EE8712  INDUSTRIAL TRAINING  L T P C
(4 weeks – during VI semester – summer)  - - - 2

OBJECTIVES:
To train the students in field work so as to have a first hand knowledge of practical problems in carrying out engineering tasks. To develop skills in facing and solving the field problems.

SYLLABUS:
The students individually undertake training in reputed Electrical Engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

OUTCOMES:
Able to understand
• the relationship between theory and practice.
• how manufacturing process works and its concrete requirements.
• the importance of discipline so as to acquire responsibility and discharge due role for a successful carrier.

EE8811  PROJECT WORK  L T P C
0 0 12 6

OBJECTIVES:
The student should be made to:
• learn methodology to select a good project and able to work in a team leading to development of hardware/software product.
• prepare a good technical report.
• Gain Motivation to present the ideas behind the project with clarity.

A Project topic must be selected either from published lists or the students themselves may propose suitable topics in consultation with their guides. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.

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 jointly by external and internal examiners constituted by the Head of the Department based on oral
presentation and the project report.

**OUTCOMES:**
At the end of the course, the student should be able to:
- select a good project and able to work in a team leading to development of hardware/software product.
- prepare a good technical report and able to present the ideas with clarity.

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**EE8001 ADAPTIVE CONTROL**

**OBJECTIVES**
- To illustrate the concept of system identification and adaptive control
- To give an introductory knowledge about black-box approach based system identification
- To give adequate knowledge on batch and recursive identification
- To give basic knowledge on Computer Controlled Systems
- To introduce the 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**
Introduction – Auto-tuning of PID controller using relay feedback approach – Types of adaptive control, Gain scheduling, Model reference adaptive control, Self-tuning controller – Design of gain scheduled adaptive controller – Applications of gain scheduling

**UNIT V MRAC & STR**
STR – Pole placement design – Indirect STR and direct STR – MRAC - MIT rule – Lyapunov
theory – Relationship between MRAC and STR

TOTAL: 45 PERIODS

OUTCOMES:

• Various system identification techniques are studied.
• Features of adaptive control and other control techniques viz., STR, MRAC are studied.

TEXTBOOKS


REFERENCES


EE8002 ADVANCED CONTROL SYSTEMS

OBJECTIVES

To gain knowledge in design of state variable systems, analysis of non-linear systems and introduction of optimal control

• To study the state variable design
• To provide adequate knowledge in the phase plane analysis
• To study describing function analysis
• To analyze the stability of the systems using different techniques
• To introduce the concepts on design of optimal controller

UNIT I STATE VARIABLE DESIGN

Control law design – State feedback and pole placement - Estimator design – Regulator design - Combined control law and estimator – Introduction of the reference input – Integral control and disturbance estimation – Effect of delays

UNIT II PHASE PLANE ANALYSIS

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non-linear systems - Concept of phase portraits – Singular points – Limit cycles
– Construction of phase portraits – Phase plane analysis of linear and non-linear systems – Isocline method

UNIT III  DESCRIBING FUNCTION ANALYSIS  9
Basic concepts - Derivation of describing functions for common non-linearities – Analysis of non-linear systems – Limit cycle - Stability

UNIT IV  STABILITY ANALYSIS  9

UNIT V  OPTIMAL CONTROL  9
Problem formulation - Linear quadratic regulator - Finite and infinite time - Variational approach to optimal control problem - Solution of Ricatti equation - Differential and Algebraic

TOTAL: 45 PERIODS

OUTCOMES
• Features of tools used for studying the nature of non-linear systems are studied.
• Basics of stability and the assessment of stability are studied.
• Basics of optimal control and its features are studied.

TEXT BOOKS

REFERENCES
2. Ashish Tewari, Modern Control Design with Matlab and Simulink, John Wiley, New Delhi, 2002
EE8003  ANALYSIS OF ELECTRICAL MACHINES  L T P C  3 0 0 3

OBJECTIVES
- To study the fundamentals of electromechanical energy conversion process in electrical equipments.
- To study the theory of transformation of multi-phase circuits and systems and its application to multi-phase induction and synchronous machines.
- To develop the time domain mathematical model of DC and AC machines and analyse their steady state and dynamic state performance

UNIT I  PRINCIPLES OF ELECTROMAGNETIC ENERGY CONVERSION  9
General expression of stored magnetic energy, co-energy and force/ torque – example using single and doubly excited system – Calculation of air - gap mmf and per phase machine inductance using physical machine data.

UNIT II  DC MACHINES  9
Voltage and torque equations – dynamic characteristics of permanent magnet and shunt DC machines – state equations - solution of dynamic characteristics by Laplace transformation.

UNIT III  REFERENCE FRAME THEORY  9

UNIT IV  INDUCTION MACHINES  9

UNIT V  SYNCHRONOUS MACHINES  9

TOTAL : 45 PERIODS
OUTCOMES:
• Development of generalised force/torque equations of electro-mechanical systems from energy and coenergy equations are studied and analysed.
• Transformation theory is studied and applied to three-phase induction and synchronous machines.
• Dynamic state models of DC and AC machines are developed and their complete time domain performance is analysed.

TEXT BOOKS

REFERENCES

EE8004 COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS L T P C 3 0 0 3

OBJECTIVES
To impart knowledge on
• Problem formulation for field computation
• Finite Element analysis
• Computer aided design of practical problems

UNIT I INTRODUCTION
Review on electromagnetic theory – Basic field equations, calculation of field distribution, inductance, capacitance, force and torque, Review on conventional electrical machine design methodology – computer aided design aspects - advantages.

UNIT II CAD PACKAGES
UNIT III  FINITE ELEMENT ANALYSIS

UNIT IV  FILED ANALYSIS USING FEA(PRACTICALS)

UNIT V  DESIGN EXAMPLES (PRACTICALS)
Design of cylindrical magnetic devices, transformer, Rotating machines.

TOTAL: 45 PERIODS

OUTCOMES:
• Ability to design electrical apparatus using finite element package.

TEXT BOOKS

REFERENCES
OBJECTIVES

• To provide an introduction to computer algorithms and data structures, with an emphasis on foundational material.
• To have a good understanding of the fundamental data structures used in computer science.
• To have a good understanding of how several fundamental algorithms work, particularly those concerned with sorting, searching and graph manipulation.
• To analyze the space and time efficiency of most algorithms.
• To design new algorithms or modify existing ones for new applications and reason about the efficiency of the result.

UNIT I INTRODUCTION AND BASIC DATA STRUCTURES
Problem solving techniques and examples-Abstract Data Type (ADT)-The list ADT Arrays-Stacks and Queues: Implementation and Application

UNIT II ADVANCED DATA STRUCTURES
Trees: Preliminaries-Binary Tree- Tree traversals-Binary search Trees-AVL Trees

UNIT III SORTING AND HASHING

UNIT IV ALGORITHM DESIGN TECHNIQUES
The role of algorithms in computing-Getting Started-Growth of functions. Divide and conquer-dynamic programming-Greedy Algorithm – Backtracking.

UNIT V GRAPHS ALGORITHMS
Elementary Graph Algorithms-Minimum Spanning Trees-Single-source shortest paths-All pairs shortest paths

OUTCOMES:
• Fundamentals of data structures and algorithms are studied.
• Features of various algorithms for different applications are studied.

TEXT BOOKS

REFERENCES

EE8006 EHV POWER TRANSMISSION  

OBJECTIVES
• To impart knowledge on EHV AC, HVDC and FACTS transmission trends with parameter calculations and study on the effect of EHV lines on living organisms

UNIT I TRANSMISSION LINE TRENDS 9
Standard transmission voltages, average values of line parameters – Power handling capacity and line losses - number of lines.

UNIT II LINE AND GROUND PARAMETERS 9

UNIT III HIGH VOLTAGE DIRECT CURRENT (HVDC) 9
HVDC system – Principle of operation, control and design consideration, HVDC circuit breaking.

UNIT IV FACTS 9
Basic concepts – Reactive power control, uncompensated transmission line, series compensation, SVC, thyristor control, series capacitor, static synchronous compensator, unified power flow controller and applications.

UNIT V ELECTROSTATIC AND MAGNETIC FIELDS OF EHV LINES 9
Electric shock – threshold currents – Calculation of electrostatic fields and magnetic fields of AC and DC lines – Effect of fields on living organism – Electrical field measurement.
OUTCOMES:
- Expose to the components of electrostatic and magnetic field effects of EHV lines.

TEXT BOOKS

REFERENCES

EE8007 EMBEDDED AUTOMATION SYSTEMS L T P C 3 0 0 3

OBJECTIVES
- To introduce different types of sensors used extensively in industrial and home, vehicle automation
- To understand the basic scheme for interfacing sensing and actuating component
- To focus on scope for embedded based secured environment for industrial and home automation

UNIT I INTRODUCTION TO SENSORS AND ACTUATORS 9
Sensor electronics and techniques - Overview of sensor measurements - Sensor linearization and characterization - Sensor classification - Pressure, position, temperature, humidity, speed, acceleration, oxygen, torque, light, distance and level- Different fire sensors, smoke detectors and their types. CO and CO2 sensors - Principles of stepper motors, Relays , solenoids , Hydraulic and pneumatic devices. Sensor and actuator circuit interface for microcontrollers
and their programming

UNIT II AUTOMOTIVE SYSTEM AND CONTROL

UNIT III AUTOMOTIVE INSTRUMENTATION

UNIT IV BUILDING AUTOMATION
RFID enabled access control with components like active, passive cards, Controllers, Antennas - Design considerations for the Fire and Alarm system. Concept of IP enabled Fire& Alarm system-Concept of energy management system, occupancy sensors, fans & lighting controller

UNIT V ADVANCED INSTRUMENTS AND STANDARDS
Basic concepts of waveform measuring instruments- analyzing recorders –advanced digital oscilloscope –Basics of virtual instrumentation-Digital field testers - test and calibration standards –traceability-EMI/EMC

TOTAL: 45 PERIODS

OUTCOMES:
• Able to design an efficient embedded automation system.

TEXT BOOKS

REFERENCES
3. Barney Capehart,’WebBasedEnterpriseEnergyandBuildingAutomationSystems’,C.E.M,
EE8008 EMBEDDED SYSTEM DESIGN L T P C

OBJECTIVES
To provide a clear understanding on the basic concepts of embedded system design and its applications to various fields:

- Building Blocks of Embedded System
- Introduction to Embedded software Tools
- Bus Communication protocol, Input/output interfacing.
- Various scheduling algorithms for process.
- Basics of Real time operating system.
- Demo with example tutorials to discuss on one real-time operating system tool

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9
Introduction to Embedded Systems – The build process for embedded systems- Structural units for a Embedded microcontroller, selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock- IDE, assembler, compiler, linker, simulator, debugger, Incircuit emulator, Target Hardware Debugging, Boundary Scan

UNIT II EMBEDDED NETWORKING 9

UNIT III INTERRUPTS SERVICE MECHANISM AND DEVICE DRIVERS 9
Programmed-I/O busy-wait approach without interrupt service mechanism-ISR concept- interrupt sources – multiple interrupts – context and periods for context switching, interrupt latency and deadline – Introduction to Device Drivers
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-, Interprocess Communication – synchronization between processes-semaphores, Mailbox.pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: VxWorks, uC/OS-II, RT Linux

UNIT V  EMBEDDED SYSTEM APPLICATION WITH DEVELOPMENT

Case Study : Washing Machine- Automotive Application- RFID- System, Application, RFIDTag, Reader-Embedded Product Development Life Cycle, Objective, Need, and different Phases & Modelling of the EDLC

TOTAL:45 PERIODS

OUTCOMES:
• Able to understand the hardware and software required to design the embedded system

TEXT BOOKS

REFERENCES
4. Han-Way Huang, ”Embedded system Design using C8051”, Cengage Learning,2009

EE8009  FLEXIBLE AC TRANSMISSION SYSTEMS

OBJECTIVES
• To expose the students to the start-of-art of the power system
• To analyze the performance of power systems with FACTS controllers.
• To model FACTS controllers for load flow and dynamic analysis

UNIT I  INTRODUCTION

Reactive power control in electrical power transmission lines -Uncompensated transmission line - series compensation – Basic concepts of Static Var Compensator (SVC) – Thyristor
Controlled Series capacitor (TCSC) – Unified power flow controller (UPFC).

UNIT II  STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS  9

UNIT III  THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS  9

UNIT IV  VOLTAGE SOURCE CONVERTER BASED FACTS CONTROLLERS  9

UNIT V  CO-ORDINATION OF FACTS CONTROLLERS  9

TOTAL : 45 PERIODS

OUTCOMES:
• Able to understand, analyse and develop analytical model of FACTS controller for power system application.

TEXT BOOKS

REFERENCES
3. V.K.Sood,HVDC and FACTS controllers – Applications of Static Converters in Power
OBJECTIVES
To understand the basic concepts and organization of Computers

- To understand the basic concepts and organization of Computers.
- Introduce the CPU architecture and micro programming
- Concepts and importance of parallelism
- Significances of Memory management and Mapping.

UNIT I  BASIC STRUCTURE OF COMPUTERS  9

UNIT II  CONTROL AND CENTRAL PROCESSING UNIT  9
Micro programmed control – Control memory, address sequencing, micro program example, and design of control unit. Central processing unit – general register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, reduced instruction set computer

UNIT III  COMPUTER ARITHMETIC, PIPELINE AND VECTOR PROCESSING  9
Computer arithmetic – addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operations decimal arithmetic unit, decimal arithmetic operations. Pipeline and vector processing – Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, vector processing array processors

UNIT IV  INPUT OUTPUT ORGANIZATION  9
Input output organization: peripheral devices, input output interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access, input output interface, serial communication

UNIT V  MEMORY ORGANIZATION  9
Memory organization – memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware

TOTAL: 45 PERIODS
OUTCOMES:
- Ability to understand the architecture and various components of computer hardware system.

TEXT BOOKS

REFERENCES

EE8011 FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING L T P C 3 0 0 3

OBJECTIVES
To Introduce the concept of Object Oriented Programming and C++.
- Familiar with the concepts of Object Oriented Programming.
- Able to appreciate the features of C++ programming Language.
- Having a thorough understanding about Classes and Objects.
- Able to develop programs in C++

UNIT I INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING AND C++ 10

UNIT II CLASSES AND OBJECTS 8
Introduction to Classes and objects – Member Functions and Member Data – Objects and Functions – Objects and Arrays – Name Spaces – Nested Classes – Dynamic Memory Allocation and Deallocation – Constructors and Destructors
UNIT III INHERITANCE AND POLYMORPHISM

Introduction – Base Class and Derived Class Pointers – Function Overriding – Base Class Initialization – Protected Access Specifier – Deriving by Different Accessing specifiers – Different Kinds of Inheritance – Order of Invocation of Constructors and Destructors – Virtual Functions – Mechanism of Virtual Functions – Pure Virtual Functions – Virtual Destructors and Constructors

UNIT IV OPERATOR OVERLOADING, TEMPLATES

Operator Overloading – Overloading various Operators – Type Conversion – New Style Casts and the typed Operator – Function Templates – Class Templates – The Standard Template Library (STL)

UNIT V EXCEPTION HANDLING AND CASE STUDIES

Introduction – C-Style Handling of Error-generating Code – C++-Style Solution-the try/throw/catch Construct – Limitations of Exception Handling. Case Studies: String Manipulations – Building classes for matrix operations

TOTAL:45 PERIODS

OUTCOMES:
• Ability to develop the object oriented programs for simple projects

TEXT BOOKS

REFERENCES
OBJECTIVES
To understand the concept, planning of DC power transmission and comparison with AC power transmission.
• To analyze HVDC converters.
• To study about the HVDC system control.
• To analyze harmonics and design of filters.
• To model and analysis the DC system under study state.

UNIT I INTRODUCTION 9
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 9
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 9
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 9
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 9
Per unit system for DC quantities – DC system model – Inclusion of constraints – Power flow analysis – case study

OUTCOMES:
• Basic principles and types of HVDC system are studied.
• Features of converters used in HVDC system are studied.
• Concepts and reactive power management, harmonics and power flow analysis are studied.

TEXT BOOKS

REFERENCES
OBJECTIVES

• To know the Industrial power quality standards
• To know mitigation techniques for harmonics and flicker problem

UNIT I  MOTOR STARTING STUDIES

UNIT II  POWER FACTOR CORRECTION STUDIES

UNIT III  HARMONIC ANALYSIS

UNIT IV  FLICKER ANALYSIS
Sources of Flicker-Flicker Analysis-Flicker Criteria-Data for Flicker analysis- Case Study-Arc Furnace Load-Minimizing the Flicker Effects.

UNIT V  GROUND GRID ANALYSIS

TOTAL : 45 PERIODS

OUTCOMES:
• Different standards of power quality are studied.
• Features of different PF correction studies, harmonic analysis and flicker analysis and grid analysis are studied.

TEXT BOOKS

REFERENCES

EE8014 MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING L T P C
3 0 0 3

OBJECTIVES
- To study the features of demand supply analysis.
- To study the pricing objectives and its methods.
- To study the basics of accounting and its types.
- To study the procedures for capital budgeting and investments.

UNIT I DEMAND & SUPPLY ANALYSIS
Firm: Types & objectives - Managerial decisions - Fundamental economic concepts Demand - Types of demand - Determinants of demand - demand function - demand elasticity - demand forecasting - supply - Determinants of supply - supply function - supply elasticity

UNIT II PRODUCTION AND COST ANALYSIS
Production function - returns to scale - Managerial uses of production function. Cost concepts - cost function - Determinants of cost - Short run and long run cost curves

UNIT III PRICING
Pricing Objectives - Determinants of price - Pricing under different market structures – price discrimination - pricing methods in practice

UNIT IV FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT)
UNIT V  CAPITAL BUDGETING

Investments - Methods of capital budgeting and accounting for risk in capital budgeting

OUTCOMES:
- Basics of demand, supply and cost analysis are studied.
- Different methods of financial accounting and capital budgeting are studied.

TEXT BOOKS

REFERENCES

EE8015  MICRO ELECTRO MECHANICAL SYSTEMS  L T P C  3 0 0 3

OBJECTIVES
- To provide the introduction to the MEMS technology
- To study the different MEMS materials and their properties
- To study the different fabrication process used in MEMS technology.
- To introduce the fundamental working principles of different sensors and actuators.

UNIT I  INTRODUCTION
Review of Electrical and Mechanical concepts in MEMS – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II  SENSORS AND ACTUATORS - I

UNIT III  SENSORS AND ACTUATORS - II

UNIT IV  MICROMACHINING
Bulk Micromachining, Surface micromachining and LIGA processes.

UNIT V  APPLICATIONS

TOTAL : 45 PERIODS

OUTCOMES:
• Able to design and analyse the performance of MEMS devices.
• Able to identify the right MEMS device against the applications.

TEXT BOOKS.

REFERENCES
OBJECTIVES

• To provide the concept and knowledge of Nanoscience and Nanotechnology.
• To know about preparation methods and nanofabrication techniques.
• To create awareness of clean room environment & societal implications of Nanotechnology
• To know about the different characterization techniques used for nano systems

UNIT I INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of bulk nanostructured materials- nano particles- quantum dots, nanowires-ultra-thin films-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties

UNIT II PREPARATION ROUTES AND LITHOGRAPHY FOR NANOSCALE DEVICES
Preparation of nanoscale materials: precipitation, mechanical milling, colloidal routes, self assembly; vapour phase deposition, CVD, sputtering, evaporation, molecular beam epitaxy, atomic layer epitaxy, lithography: optical/UV, electron beam and x-ray lithography, systems and processes, wet etching, dry etching

UNIT III PREPARATION ENVIRONMENTS
Clean rooms: specifications and design, air and water purity, requirements for particular Processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological Contamination, Safety issues, flammable and toxic hazards, biohazards, implication of Nanoscience and Nanotechnology on society.

UNIT IV CHARACTERISATION TECHNIQUES
X-ray and Neutron diffraction technique, Scanning Electron Microscopy plus environmental techniques, Transmission Electron Microscopy including high-resolution imaging, analytical electron microscopy. EDX and EELS. Surface Analysis techniques. XPS, SIMS, Auger

UNIT V EVOLVING INTERFACES OF NANO
Applications of nanotechnology: NEMS-nanosensor-nanomedicines-nanotechnology Applications to electrical engineering-nanoelectronics: quantum transport devices, molecular electronics devices, quantum computing, memory, CNT and its applications, nanomotor,
nanorobot, energy efficient battery technology, lighting system, solar cell.

**OUTCOMES:**
- To understand unique properties of nano material structure and apply them for Electrical and Electronics Engineering.

**TEXT BOOKS**
2. T. pradeep nano the essentials Tata-McGraw hill education, 2007

**REFERENCES**
2. Charles P. poole& frank J. owens, Introduction to nanotechnology, willey India.
4. Rainer wager(ed), nanoelectronics and information technology, second edition, wiley-VCH

**EE8017 OPERATIONAL RESEARCH**

**OBJECTIVES**
- To learn the basics of optimization techniques and their applications to Electrical Engineering

**UNIT I LINEAR PROGRAMMING**
Introduction - formulation of linear programming model - Graphical solution – solving LPP using simplex algorithm – Revised Simplex Method

**UNIT II ADVANCES IN LPP**
Duality theory - Dual simplex method - Sensitivity analysis — Transportation problems – Assignment problems- Traveling sales man problem - Data Envelopment Analysis
UNIT III  NON LINEAR PROGRAMMING  9
Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions – Reduced gradient algorithms – Quadratic programming method – Penalty and Barrier method.

UNIT IV  INTERIOR POINT METHODS  9

UNIT V  DYNAMIC PROGRAMMING  9

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand and apply the optimization technique for electrical engineering applications.

TEXT BOOKS

REFERENCES
**OBJECTIVES**

- To study the features of different elements used in renewable energy conversion.
- To study the hybrid operation of wind and PV systems.
- To study the features of MPPT tracking.

**UNIT I  INTRODUCTION**

Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

**UNIT II  ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION**

Reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

**UNIT III  POWER CONVERTERS**

Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing

Wind: Three phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

**UNIT IV  ANALYSIS OF WIND AND PV SYSTEMS**

Stand alone operation of fixed and variable speed wind energy conversion systems and solar system-Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

**UNIT V  HYBRID RENEWABLE ENERGY SYSTEMS**

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

**TOTAL : 45 PERIODS**
OUTCOMES:
- Features of renewable energy sources are studied.
- Features of electrical machines and converters used in renewable energy conversion are studied.
- Wind and PV systems are analysed and its hybrid operation is successfully studied.

TEXT BOOK:

REFERENCES:

EE8019 POWER QUALITY L T P C
3 0 0 3

OBJECTIVES
- To study the production of voltages sags, over voltages and harmonics and methods of control.
- To study various methods of power quality monitoring.

UNIT I INTRODUCTION TO POWER QUALITY
Terms and definitions – 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 fluctuation - Power frequency variations - International standards of power quality - Computer Business Equipment Manufacturers Associations (CBEMA) curve
UNIT II VOLTAGE SAGS AND INTERRUPTIONS
Sources of sags and interruptions - Estimating voltage sag performance - Thevenin’s equivalent source - Analysis and calculation of various faulted condition - Voltage sag due to induction motor starting - Estimation of the sag severity - Mitigation of voltage sags, active series compensators - Static transfer switches and fast transfer switches

UNIT III OVERVOLTAGES
Sources of over voltages - Capacitor switching – Lightning - Ferro resonance - Mitigation of voltage swells - Surge arresters - Low pass filters - Power conditioners - Lightning protection – Shielding - Line arresters - Protection of transformers and cables - An introduction to computer analysis tools for transients, PSCAD and EMTP

UNIT IV HARMONICS

UNIT V POWER QUALITY MONITORING
Monitoring considerations - Monitoring and diagnostic techniques for various power quality problems - Modeling of power quality (harmonics and voltage sag) problems by mathematical simulation tools - Power line disturbance analyzer – Quality measurement equipment - Harmonic / spectrum analyzer - Flicker meters - Disturbance analyzer - Applications of expert systems for power quality monitoring

TOTAL: 45PERIODS

OUTCOMES:
- Basics of power quality are studied.
- Concepts of sag and swell and harmonics are studied.
- Monitoring parameters of power quality using simulation and hardware are obtained.

TEXT BOOK
2. J. Arrillaga, N.R. Watson, S. Chen, “Power System Quality Assessment”, (New York: Wiley, 1999). (For Chapters 1, 2, 3, 4 and 5)

REFERENCES
Publications, 1994). (Chapter 1, 2, 3 and 5)


**EE8020 RESTRUCTURED POWER SYSTEMS**

**OBJECTIVES**

- To expose the students to the state-of-art of the power system
- To model and analyze the power system in restructured environment
- To familiarize the methods of energy trading

**UNIT I OVERVIEW OF KEY ISSUES IN ELECTRIC UTILITIES RESTRUCTURING**


**UNIT II ELECTRIC UTILITY MARKETS IN THE UNITED STATES**


**UNIT III OASIS: OPEN ACCESS SAME-TIME INFORMATION SYSTEM**

Experiences with OASIS in some Restructuring Models: PJM OASIS, ERCOT OASIS.

UNIT IV ELECTRIC ENERGY TRADING


UNIT V ELECTRICITY PRICING - VOLATILITY, RISK AND FORECASTING


TOTAL = 45 PERIODS

OUTCOMES
• Key issues in utilities and utility markets are studied.
• Concepts of OASIS, electricity pricing and energy marketing are studied.

TEXT BOOKS

REFERENCES
OBJECTIVES

- To study the basics of artificial neural network.
- To study the concepts of modeling and control of neural and fuzzy control schemes.
- To study the features of hybrid control schemes.

UNIT I  ARTIFICIAL NEURAL NETWORK  9

UNIT II  NEURAL NETWORKS FOR MODELING AND CONTROL  9
Modeling of non-linear systems using ANN – Generation of training data – Optimal architecture – Model validation – Control of non-linear systems using ANN – Direct and indirect neuro control schemes – Adaptive neuro controller – Familiarization with neural network toolbox

UNIT III  FUZZY SET THEORY  9
Fuzzy set theory – Fuzzy sets – Operation on fuzzy sets – Scalar cardinality, fuzzy cardinality, union and intersection, complement (Yager and Sugeno), equilibrium points, aggregation, projection, composition, cylindrical extension, fuzzy relation – Fuzzy membership functions

UNIT IV  FUZZY LOGIC FOR MODELING AND CONTROL  9

UNIT V  HYBRID CONTROL SCHEMES  9

TOTAL: 45 PERIODS

OUTCOMES:
- Basic concepts of ANN and its modeling and control aspects are studied.
- Different features of fuzzy logic and its control implementation are studied.
• Features of different hybrid control schemes are studied.

TEXTBOOKS

REFERENCE BOOKS

EE8022 SOLID STATE DRIVES

OBJECTIVES:
• To understand steady state operation and transient dynamics of a motor load system.
• To study and analyze the operation of the converter / chopper fed dc drive, both qualitatively and quantitatively.
• To study and understand the operation and performance of AC motor drives.
• To 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
Steady state analysis of the single and three phase converter fed separately excited DC motor drive – continuous and discontinuous conduction – Time ratio and current limit control – 4 quadrant operation of converter / chopper fed drive.

UNIT III INDUCTION MOTOR DRIVES
Stator voltage control – energy efficient drive – v/f control – constant air gap flux – field
weakening mode – voltage / current fed inverter – closed loop control.

UNIT IV SY SYNCHRONOUS MOTOR DRIVES

V/f control and self control of synchronous motor: Margin angle control and power factor control – permanent magnet synchronous motor.

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.

OUTCOMES:

- Basic requirement of motor selection for different load profiles are studied.
- Stability aspects of drive systems are studied.
- Important features of DC and AC drives are studied.
- Controller design for DC drives is studied.

TEXT BOOKS:


REFERENCES:


EE8023 SPECIAL ELECTRICAL MACHINES

OBJECTIVES:

To explore the theory and applications of special electrical machines.
- To review the fundamental concepts of permanent magnets and the operation of permanent magnet brushless DC motors.
- To introduce the concepts of permanent magnet brushless synchronous motors and synchronous reluctance motors.
• To develop the control methods and operating principles of switched reluctance motors.
• To introduce the concepts of stepper motors and its applications.
• To understand the basic concepts of other special machines.

UNIT I  PERMANENT MAGNET BRUSHLESS DC MOTORS
Fundamentals of Permanent Magnets - Types - Principle of operation - Magnetic circuit analysis - EMF and Torque equations - Characteristics and control

UNIT II  PERMANENT MAGNET SYNCHRONOUS MOTORS

UNIT III  SWITCHED RELUCTANCE MOTORS
Constructional features – Principle of operation - Torque prediction – Characteristics – Power controllers – Control of SRM drive - Sensorless operation of SRM – Applications.

UNIT IV  STEPPER MOTORS

UNIT V  OTHER SPECIAL MACHINES
Principle of operation and characteristics of Hysteresis motor – AC series motors – Linear motor – Applications.

TOTAL : 45 PERIODS

OUTCOMES:
• Need for special electrical machines are studied.
• Different features of special machines and converter circuits for special machines are obtained

TEXT BOOKS:

REFERENCES:
1. T.Kenjo and S.Nagamori, Permanent magnet and Brushless DC motors, Clarendon
EE8024 VLSI DESIGN AND ARCHITECTURE

OBJECTIVES
To understand the basic concepts of VLSI and CMOS design.
• Introduce the basics of VLSI design and its importance.
• Analyse the switching Characteristics of MOS transistor.
• Study the construction of NMOS, CMOS and Bi-CMOS based logic circuits.
• To learn about the programming of Programmable device using Hardware description Language.

UNIT I BASIC MOS TRANSISTOR
Enhancement mode & Depletion mode – Fabrication (NMOS, PMOS, CMOS, BiCMOS) Technology – NMOS transistor current equation – second order effects – MOS Transistor Model.

UNIT II NMOS & CMOS INVERTER AND GATES
NMOS & CMOS inverter – Determination of pull up / pull down ratios – stick diagram – lambda based rules – super buffers – BiCMOS & steering logic

UNIT III SUB SYSTEM DESIGN & LAYOUT

UNIT IV DESIGN OF COMBINATIONAL ELEMENTS & REGULAR ARRAYLOGIC
Programmable Logic Devices- PLA,PAL,GAL, CPLD , FPGA— Implementation of Finite State Machine with PLDs
UNIT V VHDL PROGRAMMING


TOTAL: 45 PERIODS

OUTCOMES

- Expose to HDL language and ability to design PLD devices and simple application.

TEXT BOOKS


REFERENCES


MA8353 NUMERICAL METHODS

OBJECTIVES

- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

by Jacobi’s method

UNIT II INTERPOLATION AND APPROXIMATION 9+3
Interpolation with unequal intervals - Lagrange interpolation - Newton’s divided difference interpolation – Cubic Splines – Interpolation with equal intervals – Newton’s forward and backward difference formulae – Least square method – Linear curve fitting.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+3
Finite difference methods for solving 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:
• Able to have a clear perception of the power of numerical techniques, ideas and to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXT BOOKS
REFERENCES

MA8356 PROBABILITY AND STATISTICS

OBJECTIVES
• To make the students acquire a sound knowledge in statistical techniques that model engineering problems.
• The Students will have a fundamental knowledge of the concepts of probability

UNIT I RANDOM VARIABLES
Discrete and Continuous random variables - Moments - Moment generating functions - Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable

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 TESTS OF SIGNIFICANCE
Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) - Tests for single variance and equality of variances - χ²-test for goodness of fit - Independence of attributes - Non-parametric tests: Test for Randomness and Rank-sum test (Wilcoxon test).

UNIT IV DESIGN OF EXPERIMENTS
Completely randomized design - Randomized block design - Latin square design - 2² - factorial
design - Taguchi’s robust parameter 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:

• Able to understand, analyse and solve problems on random variables and statistics.

TEXT BOOKS


REFERENCES


MA8451 DISCRETE MATHEMATICS

OBJECTIVES

At the end of the course, students would

• Have knowledge of the concepts needed to test the logic of a program.
• Have an understanding in identifying structures on many levels.
• Be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
• Be aware of the counting principles.
• Be exposed to concepts and properties of algebraic structures such as semi groups,
monoids and groups

UNIT I LOGIC AND PROOFS 9+3
Propositional Logic – Propositional equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy

UNIT II COMBINATORICS 9+3

UNIT III GRAPHS 9+3
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths

UNIT IV ALGEBRAIC STRUCTURES 9+3
Algebraic systems – Semi groups and monoids – Groups - Subgroups Homomorphisms – Normal subgroup and coset – Lagrange’s theorem – Definitions and examples of Rings and Fields

UNIT V LATTICES AND BOOLEAN ALGEBRA 9+3

TOTAL: 60 PERIODS

OUTCOMES:
• Have knowledge of the concepts needed to test the logic of a program.
• Have an understanding in identifying structures on many levels.
• Aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
• Aware of the counting principles.
• Exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

TEXT BOOKS
2. Tremblay J.P. and Manohar R, “Discrete Mathematical Structures with Applications to
REFERENCES

GE8751 ENGINEERING ETHICS AND HUMAN VALUES

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 – The Challenger Case Study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS
UNIT V  GLOBAL ISSUES


TOTAL: 45 PERIODS

OUTCOMES:

• Able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXTBOOK

REFERENCES:

WEB SOURCES:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org
OBJECTIVES

• To understand the various principles, practices of TQM to achieve quality.
• To learn the various statistical approaches for Quality control.
• To understand the TQM tools for continuous process improvement.
• To learn the importance of ISO and Quality systems

UNIT I  INTRODUCTION

UNIT II  TQM PRINCIPLES
Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III  TQM TOOLS & TECHNIQUES I

UNIT IV  TQM TOOLS & TECHNIQUES II

UNIT V  QUALITY SYSTEMS

TOTAL : 45 PERIODS

OUTCOMES:

• Able to apply the tools and techniques of quality management to manufacturing and services processes.
TEXT BOOK:

REFERENCE BOOKS:

CS8451 OPERATING SYSTEMS L T P C 3 0 0 3

OBJECTIVES
- To impart knowledge about process synchronization, inter-process communication, scheduling, deadlock handling, and memory management.

UNIT I OPERATING SYSTEMS OVERVIEW

UNIT II PROCESS MANAGEMENT
UNIT III STORAGE MANAGEMENT 9

UNIT IV I/O SYSTEMS 9

UNIT V CASE STUDY 9

TOTAL: 45 PERIODS

OUTCOMES
• Aspects of operating systems are studied.
• Features of process and storage management are studied.
• Concepts of disk scheduling protection and protection are studied.

TEXT BOOKS:

REFERENCES:
OBJECTIVES
To impart knowledge
- on the serial interface standards.
- on the principle of network architecture and protocol stack.
- about the characteristics and functions of the individual layers of the protocol stack
- about the wired and wireless communication protocols used in industrial networks.

UNIT I   RS – 232 AND RS – 485

UNIT II MODBUS DATA HIGHWAY (PLUS) AND HART PROTOCOLS

UNIT III AS – INTFACE (AS-I) AND DEVICENET
AS interfaces:- Introduction, Physical layer, Data link layer and Operating characteristics. Devicenet:- Introduction Physical layer, Data link layer and Application layer.

UNIT IV PROFIBUS PA/DP/FMS AND FF
Profibus:- Introduction, Profibus protocol stack, Profibus communication model, Communication objects, System operations and Troubleshooting – Foundation fieldbus versus Profibus.

UNIT V INDUSTRIAL ETHERNET AND WIRELESS COMMUNICATION
Industrial Ethernet:- Introduction, 10Mbps Ethernet and 100Mbps Ethernet – Radio and wireless communication:- Introduction, Components of radio link, the radio spectrum and frequency allocation and radio modems – Comparison between various industrial networks.

TOTAL: 45 PERIODS

OUTCOMES
- Able to gain knowledge on the serial interface standards, network architecture and protocol stack
- Able to get familiarized with the wired and wireless communication protocols used in industrial networks.

TEXT BOOKS:
2. Buchanan, W., “Computer Buses”, CRC Press, 2000,
REFERENCES:

EE8025 MEDICAL INSTRUMENTATION

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
Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals
- Basic components of a biomedical system - Cardiovascular systems - Respiratory systems
- Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues - Basic mechanics of spinal column and limbs - Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors.

UNIT II NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES

UNIT III ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS
UNIT IV  IMAGING MODALITIES AND ANALYSIS


UNIT V  LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES


OUTCOMES:
• Ability to understand and analyze instrumentation systems and their applications to various industries.

TEXT BOOKS:

REFERENCES
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 stakeholders- 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 able 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, Scenarious in the Indian context, Disaster damage assessment and management.

TEXT BOOKS:

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

GE8073 HUMAN RIGHTS LT P C 3 0 0 3

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

OUTCOMES :

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

REFERENCES: