SIR PADAMPAT SINGHANIA UNIVERSITY
Udaipur
SCHOOL OF ENGINEERING
Course Curriculum of 4-Year B.Tech. Degree Programme
in
Electrical Engineering
(Batch: 2017-21)

Credit Structure

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Distribution of Total Credits & Contact Hours in all Semesters

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Course Structure: B.Tech. 2017-21

Semester-I

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Total Contact hours/week 31

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<td>3</td>
<td>EE-370</td>
<td>Advance Machine Drives</td>
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### List of Departmental Elective(s) - III

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<td>1</td>
<td>EE-456</td>
<td>Advanced Power Electronic Converters</td>
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<td>Advanced Power System</td>
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<td>EE-458</td>
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### List of Open Elective- I

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<td>HU-252</td>
<td>Language through Literature &amp; Films</td>
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<td>2</td>
<td>BM-270</td>
<td>Foundations of Economic Science</td>
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### List of Open Elective- II

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<td>Fun with Drama</td>
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<td>Marketing Management</td>
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### List of Open Elective-III

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<td>BT-471</td>
<td>Bioprocess Technology</td>
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<td>2</td>
<td>CE-462</td>
<td>Air Pollution &amp; Industrial Waste Management</td>
<td>3</td>
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<td>3</td>
<td>CS-462</td>
<td>Management Information Systems &amp; E-Commerce</td>
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<td>EC-475</td>
<td>Computer Networks</td>
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<td>EE-465</td>
<td>Energy Conversion Process</td>
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<td>6</td>
<td>MA-451</td>
<td>Probability Theory</td>
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<td>ME-465</td>
<td>Solar Energy &amp; Applications</td>
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<td>PH-451</td>
<td>Nanotechnology</td>
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<td>Chaos in Engineering System</td>
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# List of Open Elective-IV

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<th>Credit(s)</th>
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<tr>
<td>1</td>
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<td>Bioremediation Technology</td>
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<td>Environmental Management</td>
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<td>3</td>
<td>CS-459</td>
<td>Statistical Simulation &amp; Data Analysis</td>
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<td>4</td>
<td>EC-473</td>
<td>Robotics &amp; Automation</td>
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<tr>
<td>5</td>
<td>ME-466</td>
<td>Power Generation &amp; Economics</td>
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# List of Open Elective- V

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<tr>
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<td>Hydro Power Generation</td>
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<td>Mathematical Statistics</td>
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<td>Total Quality Management</td>
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<tr>
<td>6</td>
<td>PH-455</td>
<td>Electromagnetic theory &amp; Application</td>
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</table>
Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester - I

(Departmental Core Subject)

CE-151
Engineering Mechanics

L-T-P-C
3-1-0-4

Objective: The subject deals with the concepts of static & dynamic systems involving kinematic & dynamic analysis.

Course Content
Basic principles: Equivalent force system; Equations of equilibrium; Free body diagram; Reaction; Static indeterminacy. Structures: Difference between trusses, frames & beams, Assumptions followed in the analysis of structures; 2D truss; Method of joints; Method of section; Frame; Simple beam; types of loading & supports; Shear Force & bending Moment diagram in beams; Relation among load, shear force & bending moment. Friction: Dry friction; Description & applications of friction in wedges, thrust bearing (disk friction), belt, screw, journal bearing (Axle friction); Rolling resistance. Virtual work & Energy method: Virtual Displacement; Principle of virtual work; Applications of virtual work principle to machines; Mechanical efficiency; Work of a force/couple (springs etc.); Potential energy & equilibrium; stability. Center of Gravity & Moment of Inertia: First & second moment of area; Radius of gyration; Parallel axis theorem; Product of inertia, Rotation of axes & principal moment of inertia; Moment of inertia of simple & composite bodies. Mass moment of inertia. Kinematics of Particles: Rectilinear motion; Curvilinear motion; Use of Cartesian, polar & spherical coordinate system; Relative & constrained motion; Space curvilinear motion. Kinetics of Particles: Force, mass & acceleration; Work & energy; Impulse & momentum; Impact problems; System of particles. Kinematics & Kinetics of Rigid Bodies: Translation; Fixed axis
rotational; General plane motion; Coriolis acceleration; Work-energy; Power; Potential energy; Impulse-momentum & associated conservation principles; Euler equations of motion & its application.

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester - I

(Departmental Core Subject)

ME-151
Engineering Drawing & Computer Aided Drafting

L-T-P-C: 0-1-1-2

Objective: Engineering drawing is a visual language of an engineer. It permits students to convert an object into its visual representation.

Course Content
Importance of engineering drawing; Conventions & standards: ISO; Scales; Curves; Orthographic projections: points, lines, planes & solids; Sections of solids; Isometric projections; Development of surfaces; Intersection of solids.

List of Experiments
1. Introduction to Engineering Graphics, Sheet Layout, instruments, BIS standards, Lines, Lettering & Dimensioning
2. Scales -Types of Scales-Plain Scale, Diagonal scale, vernier scale
3. Curves- conic sections, ellipse, parabola, hyperbola, cycloid, epicycloid, hypocycloid
4. Orthographic Projections-Introduction, multi-view projection system, orthographic views, Methods of multi-view projections, projecting side views, Sectional Views
5. Projection of Points -Introduction, position of points in I, II, III & IV quadrant
6. Projection of Lines & Auxiliary projections-, Line inclined to one plane & parallel to the other-Line inclined to both the planes. Projection on auxiliary planes
7. Projection of Planes- Introduction, Perpendicular & parallel to the reference planes Projections of planes inclined to one reference plane & perpendicular to the other, plane inclined to both ref. planes
8. Projection of solids with axes inclined to one of the reference plane & parallel to the other
10. Section of Solids- Sections of prisms, pyramids, cone cylinder
11. Development of Surfaces- Methods of development-Cube, prisms, pyramids, cone cylinder
12. Intersection of Surfaces- Line method-cutting plane method, Intersection of two prisms- Intersection of cylinder & cylinder
13. Isometric Projection- Isometric axes lines & planes, Isometric Scale, Isometric views of standard shapes, solids

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme in Electrical Engineering

Semester - I

(Departmental Core Subject)

ME-152 Manufacturing Practices  L-T-P-C  0-0-1-1

Objective: This course is intended to impart basic knowledge of various hand tools & their usage in different sections of manufacturing; including Carpentry, Fitting, House wiring, Black smithy, Tin smithy.

List of Experiments

1. Demonstration of the manufacturing practices, workshop safety, trades, tools, experiments
2. Measurement of the dimensions of a given job using precision instruments
3. Fabrication of a fitting job with drilling & tapping of a hole
4. Preparation of a funnel with spout as per drawing from 30 SWG. G.I sheet. Joints to be soldered with the soldering iron
5. Fabrication of a T-half lap joint & T-bridle joint
6. Preparation of a wooden patterns as per given drawings
7. Preparation of a mould for a given wooden pattern
8. Preparation of an aluminum casting with the help of a given wooden pattern

Text/Reference Books

Detailed Syllabus for B. Tech. Degree Programme in Electrical Engineering

Semester - I

(Humanities & Basic Sciences Subject)

HU-153 Professional Communication - I
L-T-P-C 1-1-0-2

Objective: To develop communicative competence.

Course Content
Communication: Importance of effective communication skills, Objectives and Process of communication; Types of communication: Verbal and non-verbal; Channels of communication, Media of communication; Barriers to communication: Physical, Psychological, Mechanical, Linguistic and Cultural; Types of listening, Principles of effective listening
Word Power: Words often misspelt, One word substitute, Use of idiomatic expressions and phrases
Time & Stress Management: Planning, Scheduling & Prioritizing, Multitasking, Delegating; Saying no assertively; Stress & its causes, Barriers to stress management & Handling stress

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester - I

(Humanities & Basic Sciences Subject)

CH-154
Chemistry - I

Objective: The subject deal with the concepts related to Physical chemistry & develops a scientific attitude by means of distinguishing, analyzing & solving various engineering problems. It also provides in-depth knowledge of thermodynamics, quantum chemistry, chemical kinetic, corrosion & colloids.

Course Content
Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson & throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature. Evaluation of entropy: characteristics & expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases.

Work function & free energy: Definition, characteristics, physical significance, mathematical expression of $\Delta A$ & $\Delta G$ for ideal gas, Maxwell's Expression (only the derivation of 4 different forms), Gibbs Helmholtz equation. Condition of spontaneity & equilibrium reaction. Chemical potential, Real gas, Real Solution, Cell EMF & its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half-cell, quinhydrone half-cell & calomel half-cell (construction, representation, cell reaction, expression of potential, Discussion, Application).

Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, Discussion, Application). Application of EMF measurement on

1. Ascertain the change in thermodynamic function ($\Delta G$, $\Delta H$, $\Delta S$)
2. Ascertain the equilibrium constant of a reversible chemical reaction
3. Ascertain the valency of an ion.


**List of Experiments**

1. Determination of water hardness by complexometric titration.
2. Determination of total alkalinity of water sample.
3. Determination of chloride ion in water sample by Argentometric method.
4. Determination of total dissolved oxygen content in water sample by Wrinkler's method.
5. Copper sulfate estimation by iodometric titration.
6. Potassium dichromate estimation by iodometric titration.
7. Redox titration: Estimation of FAS by internal & external indicators.
8. Gravimetric analysis: Estimation of Ba as BaSO₄
9. Gravimetric analysis: Estimation of Ag as AgCl
10. pH metric measurements: Determination of strength of unknown HCl solution by pH metric titration.

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme in Electrical Engineering

Semester - I

(Humanities & Basic Sciences Subject)

MA-151 Mathematics - I

Objective: To develop an understanding of the fundamental concepts of the calculus, differential equations & linear algebra to connect them with real world problems from other disciplines along with the development of mathematical reasoning & problem solving abilities.

Course Content

Differential Calculus (Functions of one variable): Taylor’s & Maclaurin’s theorems with remainders, concavity & convexity of a curve, points of inflexion, asymptotes & curvature.

Differential Calculus (Functions of several variables): Partial derivatives & their geometrical interpretation, derivatives of composite & implicit functions, Euler’s theorem on homogeneous functions, harmonic functions, Taylor’s expansion of functions of several variables, maxima & minima - Lagrange’s method of multipliers.

Integral Calculus: application to length, area, volume & surface area of revolution. Multiple integrals with applications to: volume, surface area & moments of inertia.

Ordinary Differential Equations: Solution of dy/dx = f(x, y); linear differential operator L, higher order ordinary differential equations with constant coefficients.

Matrix Algebra: Rank & inverse of a matrix, consistency of linear system of equations; Eigen values, Eigen vectors & their applications to system of ordinary differential equations; Cayley-Hamilton theorem; Diagonalization of matrices.
Text/Reference Books

Objective: Objective of this course is to introduce concepts of electrostatics & magnetostatics leading to the Maxwell’s electromagnetic waves & understanding the wave nature of light using various optical phenomena like interference, diffraction & polarization. The particle nature of electromagnetic wave will also be introduced.

Course Content
Gauss law & its applications in electrostatics in vector form, electric polarization, permittivity, energy density in an electric field, Ampere’s law, charged particle motion in E & B fields, magnetization, Faraday’s law of electromagnetic induction; Equation of continuity, generalized Ampere’s law, Maxwell’s equations, wave equation, plane wave solutions, electromagnetic wave propagation in dielectrics & conductors, reflection/refraction, polarization, interference, diffraction of EM waves Origin of quantum hypothesis, de Broglie’s hypothesis of matter waves, Uncertainty principle, Wave function & wave mechanics, Schrodinger equation, QM operators, Expectation value, one-dimensional solutions: zero potential, step potential, potential barrier & potential well.

List of Experiments
1. Determination of wavelength of sodium light source using Newton’s Ring Method
2. Determination of wavelength of monochromatic light source using Fresnel’s Biprism
3. Determination of the wavelength of monochromatic light using Michelson Interferometer
4. Determination of wavelength of laser using single slit diffraction
5. Determination of the wavelength of prominent lines of mercury using plane transmission grating
6. Determination of specific rotation of sugar solution using Polarimeter
7. Determination of Refractive index and dispersive power of prism material using spectrometer
8. Verification of the Biot Savart's law
9. Study of variation of magnetic field along the axis of a circular coil and determination of the radius of the coil
10. Determination of frequency of AC mains using Sonometer
11. Determination of the characteristic constant or ballistic constant of a ballistic galvanometer

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester - II

(Departmental Core Subject)

CS-152  L-T-P-C
Introduction to Computers & Programming         2-0-2-4

Objective: This course is an introductory course of computer science. It provides basic
insight into the building blocks of a modern day computer & the newest peripherals
attached with it. In addition to this, the students will be delved into the basic
programming concepts of a high level language.

Course Content
Introduction to computer architecture; memory, ALU, CPU, I/O devices. Introduction to
system software; operating systems, compilers and multi-user environments. Concept
of an algorithm. Introduction to the design and implementation of correct, efficient and
maintainable programs. Use of high level programming language for the systematic
development of programs.

List of Experiments
1. Basic & calculation based programs
2. Conversion based programs
3. Decision making statement & operator based programs
4. Loop based programs
5. Multi way decision making statement based programs
6. Array based programs
7. Strings based programs
8. Function based programs
9. Structure based programs
10. Pointers based programs
11. File handling based programs

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester - I

(Departmental Core Subject)

EC-152 Basics of Electrical & Electronics Engineering

Objective: The aim of this course is to develop an understanding of the basics of electrical & electronics components, circuits & systems, operation of transformers & other electrical machines.

Course Content


Introduction to Transformers & AC Machines: Ideal Transformer, Circuit Model of Transformer, Efficiency, Three Phase Induction Motor.

Introduction to Fractional-kW Motors & DC Machines: Single Phase Induction Motors, DC Generator & DC Motor.

List of Experiments
1. Study & Verification of Kirchoff ’s Current Law  
2. Study & Verification of Kirchoff ’s Voltage Law  
3. Study & Verification of Thevenin’s Theorem for dc network  
4. Study & Verification of Norton’s Theorem for dc network  
5. Study & Verification of R-C series circuit & determination of phase angle  
6. Study of the volt-ampere (V-I) characteristics for Silicon P-N Junction diode  
7. Study of the volt-ampere (V-I) characteristics for a Zener diode  
8. Study of the input & output characteristics for a transistor in common base configuration  
9. Verification of Truth Table for basic & universal logic gates  
10. Determination of copper loss & core loss for a single phase transformer through O/C-S/C Test  

**Text/Reference Books**  
Detailed Syllabus for B. Tech. Degree Programme in Electrical Engineering

Semester - II

(Humanities & Basic Sciences Subject)

HU-154 Professional Communication - II

L-T-P-C

1-1-0-2

Objective: To build interpersonal skills & communicate effectively.

Course Content

Business Meetings: Notice, Agenda, Minutes of Meeting
Group Discussions: Classification of GD topics; GD as a part of the selection process; GD phases; Non-verbal communication in GD, Do’s & don’ts of GD.
Professional Mannnerisms & Grooming: Kinesics, Office etiquette; Telephone skills, Netiquette
SWOT, Résumé, Cover letter writing, Job Acceptance Letter.
Goal setting: Significance, Progressive steps to achieve goals; Anticipating career challenges & utilizing opportunities.

Text/Reference Books

Objective: This course aims at understanding various concepts of inorganic & organic chemistry, broad spectrum knowledge of chemical bonding, organic reaction mechanism, stereochemistry, spectroscopy, polymer science, green chemistry & environmental pollution studies.

Course Content
Bonding Models in Inorganic Chemistry- Introduction, Ionic bonding: Introduction to stoichiometric defects (Schottky & Frenkel) & non – stoichiometric defects (Metal excess & metal deficiency). Role of silicon & germanium in the field of semiconductor. Valence shell Electron Repulsion Theory (VSEPR). Discussion of structures of IF₃, SnCl₂, CO₃²⁻ & Valence bond theory, Molecular orbital theory Linear combination of atomic orbitals (LCAO) method. Structures of simple heteronuclear diatomic molecules such as CO, NO, HF, Coordination numbers, Crystal field theory, Metal ions in Biological systems, Air Pollution Types of pollutants, source effects, sink & control of primary pollutants – CO, NOx, HC, SOx & particulates, effects of pollutants on man & environment – photochemical smog & acid rain. Greenhouse effect, ozone layer depletion, Water Pollution: Classification of pollutants, their sources, effects of water pollutions on human & plant life, waste water treatment – domestic & industrial. Pollution due to Oil & grease in water. Thermal pollution: Sources, effects of thermal pollution on plant & animal life, control techniques, radioactive pollution: sources, effects, treatment & disposal, Solid Waste Management, Weapons of mass destruction,
Biological weapons, chemical weapons, disarmament & peaceful uses of chemistry in day to day life. Green Chemistry, 12 principles of green chemistry, application of green chemistry in industrial processes, Renewable & Non-renewable energy resources & Primary & Secondary energy resources, Polymers, Organic Reaction Mechanism, Stereochemistry of Carbon Compounds, Basic concepts of spectroscopy, UV-VIS spectroscopy, applications, Fundamentals of Microwave & IR spectroscopy & its applications, determination of molecular structure.

**List of Experiments**

1. Inorganic qualitative analysis: Detection of acid radicals.
2. Inorganic qualitative analysis: Detection of basic radicals.
3. Estimation of available chlorine in bleaching powder sample.
4. Thin layer chromatography: Separation of given amino acids by TLC method.
5. Determination of rate constant of a first order reaction by titrimetric method.
7. Conductometric measurements: Determination of strength of unknown HCl solution by conductometric titration.
8. Qualitative analysis of single solid organic compounds: Detection of characteristic elements (N, Cl, Br & I) by chemical tests.
9. Qualitative analysis of single solid organic compounds: Detection of functional groups by systematic chemical tests.
10. Flame photometry: Determination of Na & K in water sample.

**Text/Reference Books**

Detailed Syllabus for B. Tech. Degree Programme in Electrical Engineering

Semester - II

(Humanities & Basic Sciences Subject)

MA-152 Mathematics - II

L-T-P-C 3-1-0-4

Objective: The objective of the course is to make the students familiar with certain important mathematical techniques involving complex analysis & transforms which have applications in various disciplines of Engineering & Technology.

Course Content


Fourier Series: Periodic functions, Fourier series representation of a function, half range series, sine & cosine series, Fourier integral formula, Parseval's identity.
Text/Reference Books
Objective: The objective of this course to introduce the notion of quantum physics & its applications in understanding the electrical, thermal & magnetic properties of various materials, band theory of solids, nanostructures, lasers, superconductivity & its applications.

Course Content

List of Experiments
1. Determination of Planck's constant using Light Emitting Diode
2. Determination of temperature coefficient, reverse saturation current and energy band gap of a P-N junction
3. Determination of the energy band gap of semiconductor using four-probe method
4. Determination of the charge carrier concentration and Hall coefficient of a given semiconductor using Hall experiment setup
5. Determination of the ratio of e/m for the electron using the helical method
6. Determination of electronic charge by Millikan's oil drop method
7. Determination of velocity of ultrasonic waves using quartz crystal
8. Determination of wavelength of He-Ne laser using millimeter scale as a grating
9. Determination of wavelength of Diode laser using single slit / double slit and obtain diffraction patterns of different apertures
10. Determination of numerical aperture of an optical fibre cable
11. Determination of capacitance of a parallel plate capacitor with and without dielectric material
12. Determination of the height of a distant object/building with the help of sextant

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme

Endeavour Project (Beyond the Syllabus) 0-0-0-3

Our University is continuously looking at innovative ways to deliver knowledge to our students, making learning & delivery mechanism innovative, interesting & easy with truly ‘out of the box’ teaching-learning process. This beyond the syllabus initiative uses all working second Saturdays as class days.

Endeavour is a compulsory interdisciplinary project for all students of the University. Respective Heads of the Department shall select students & form groups. Each project shall be supervised by a faculty member.

The faculty of SPSU will select a contemporary topic, which is preferably industry relevant & associate a company or professional who can provide application-oriented perspective. The topic chosen may be from wide range of subjects. For example: - Biodiversity, Social subjects, Media & advertisement, Environment, Scientific, Technical, Management, Architecture, Tourism or any other subject or their combination.

The project is evaluated in two phases: Internal Evaluation & External Evaluation. This ensures descriptive assessment of the projects performance & challenges faced during the implementation of the project. The project will be spread over two semesters beginning from the odd semester (July to November) & ending in the even semester (December to May) every year. The grade obtained in this course may be used to improve the student’s semester grade point average.

The final report should include the reasons for the choice of the title, the concept, the structure, the results with working models/drawings etc. & its practicality. The role & responsibility of every individual of the group should be indicated clearly. The report should be written in the prescribed format/guidelines, certified by the faculty member & presented as a seminar.

The project is evaluated as per the approved procedure & marks obtained are computed in the even semester.
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-III

(Departmental Core Subject)

EE-251
Signals & Networks

Objective: This course discusses continuous/discrete time signals & systems, which are the basic tools, used in analysis of the frequency & transform domain methods.

Course Content

Objective & overview, signal & system types & classifications, step response, impulse response & convolution integral; Periodic signal analysis: Fourier series & properties; A periodic signal analysis : Fourier Transform - its properties & sinusoidal steady state analysis of systems; Elements of electrical network : dependent & independent sources, active & passive components; classical differential equations for description of transient conditions of Network; Solutions of linear time invariant networks with initial conditions; Unilateral & Bilateral Laplace Transforms & properties; Transient solutions of networks using Laplace Transform; Network functions: poles, zeros, transfer function, Bode plot; One & two port network parameters & functions : Z, Y & ABCD parameters, driving point & transfer impedances & admittances; Network Theorems & Formulation of Network equations: generalized formulation of KCL, KVL, State Variable descriptions; Thevenin, Norton, Maximum Power Transfer, Tellegen & Reciprocity Theorems; Graph theory: Tree, Co-tree, fundamental cut-set, fundamental loop analysis of network; Analog filter design: Butterworth, Sallen Key, frequency transformation & scaling.

List of Experiments

1. Analysis of voltage & current divider networks & verification of Kirchhoff’s laws
2. Verification of Thevenin & Norton theorem
3. Verification of Superposition theorem
4. Verification of Maximum Power Transfer theorem & to find the value of the load resistor for maximum power transfer
5. Analysis of the step response of RC, RL & RLC circuit
6. Evaluation of the frequency response of RLC series circuit & analyze series circuit resonance along with the computation of BW & Q factor
7. Evaluation of the frequency response of RLC Parallel circuit & analyze parallel circuit resonance along with the computation of BW & Q factor
8. Determination of the impedance (Z) parameter of a two-port resistive network
9. Determination of the admittance(Y) parameters of a two-port resistive network
10. Calculation & verification of ABCD parameters of the two-port network
11. Determination of the hybrid parameters of a two-port resistive network
12. Plotting of the frequency responses of Low Pass & High Pass Filters

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-III

(Departmental Core Subject)

EE-252 Electrical Technology

L–T–P–C 3–1– 1–5

Objective: To introduce about power system & expose the construction, working Principle & performance of the D.C.Machines & Transformers (Single Phase & Polyphase)

Course Content
Introduction: Sources of energy; General structure of electrical power systems, Power transmission & distribution via overhead lines & underground cables, Steam, Hydel, Gas & Nuclear power generation.


Transformers: Constructional features; Ideal transformer & practical transformer, name plate rating, phasor diagrams, equivalent circuit & determination of its parameters from O.C & S.C tests; Per unit parameter values & its importance; EMF equation Regulation, efficiency & all day efficiency & expressions & calculations. Sumpner Test. 3-phase Transformer: As a single unit with name plate rating & as a bank of three single phase transformers; Vector groups for various connections; Per phase analysis; Qualitative explanation for origin of harmonic current & voltage & its suppression tertiary winding. Parallel operation conditions & load sharing. Autotransformer: Basic constructional
features; VA conducted magnetically & electrically. Comparative study with two winding transformer. Three phase AC Circuits: Three phase EMF generation, delta & Y – connections, line & phase quantities, solution of three phase circuits, balanced supply voltage & balanced load, phasor diagram.

**List of Experiments**

1. Determination of the efficiency of two identical D.C. Machine by Hopkinson’s regenerative test
2. Determination of the efficiency of D.C. shunt motor by loss summation (Swinburne’s) method
3. Speed control of D.C. shunt motor by (a) field current control method & plot the curve for speed Vs field current. (b) armature voltage control method & plot the curve for speed Vs armature voltage
4. Speed control of a D.C. motor by Ward Leonard method & to plot the curve for speed Vs applied armature voltage
5. Determination of the core losses & copper losses by O.C. & S.C. test on a 1-phase transformer & also find the parameters of its equivalent circuit, voltage regulation & efficiency
6. Performance of the back-to-back test on two identical 1-phase transformers & find their efficiency & parameters of the equivalent circuit
7. Performance of parallel operation of two 1-phase transformers & determine their load sharing
8. Determination of the efficiency & voltage regulation of a single-phase transformer by direct loading
9. Performance of the OC & SC test on a 3-phase transformer & find its efficiency & parameters of its equivalent circuit
10. Performance of the parallel operation of two 3-phase transformers & determine their load sharing
11. Study of the performance of 3-phase transformer for its various connections, i.e. star/star or star/delta delta/star & delta/delta & find the magnitude of 3rd harmonic current
Text/Reference Books

Detailed Syllabus for B. Tech. Degree Programme in Electrical Engineering

Semester- III

(Departmental Core Subject)

EC-262 Electronics Devices & Circuits 3-1-1- 5

Objective: To equip the students with a sound understanding of fundamental concepts of analog electronic circuits and to know the diversity of operations that the op amp can perform in a wide range of applications along with study of the different types of ICs and its applications.

Course Content
Band structure of p-n junction and current components, Quantitative theory of P-N junction diode, Volt-ampere characteristics and its temperature dependence Narrow-base diode, Transition and diffusion capacitance of P-N junction Diodes, Break down of junctions on reverse bias, Zener and Avalanche breakdowns, Tunnel diode and its V-I characteristics, Use of diodes in rectification circuits, Clipping and clamping circuits, PNP and NPN junction transistors, Characteristics of the current flow across the base regions, Minority and majority carrier profiles, Transistor as a device in CB and their characteristics, Transistor as a device in CE and CC their characteristics, Transistor biasing: DC bias and stabilization, Various stabilization circuits, Thermal runaway and thermal Stability, Bias compensation Techniques, JFET and its characteristics. Pinch off voltage and drain saturation current, MOSFET- enhancement, depletion modes, FET biasing, Equivalent ckt of FET, low frequency FET Amplifiers, Transistor hybrid model using 'h' parameters, Analysis of CB,CC,CE configuration, Miller’s theorem, Darlington Emitter follower, Boot strapping Darlington pair, Cascaded BJT amplifier and RC coupled amplifier, Effect of bypass and coupling capacitors on the low frequency
response of the amplifier, Transistorized Differential amplifier, Class A and small signal analysis, Class B and small signal analysis, Class C and small signal analysis, Class AB push pull amplifier, collector efficiency of each, cross over distortion.

**List of Experiments**

1. Frequency response of CE amplifier
2. Frequency response of CC amplifier
3. H-parameters of CE configuration
4. Frequency response of common source FET amplifier
5. RC coupled single stage amplifier & determination of the gain frequency response, input and output impedances
6. Testing of diode clipping (single / double ended) circuits for peak clipping
7. Testing of clamping circuits: positive clamping/negative clamping
8. Testing the performance of BJT - RC phase shift oscillator for f0 ≤ 10 KHz
9. Testing the performance of BJT – Hartley & Colpitts oscillators for RF range f0≥100 KHz
10. Testing the performance of BJT – Colpitts oscillators for RF range f0≥100 KHz

**Text/Reference Books:**

Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester – III

(Departmental Core Subject)

CS-261 Fundamentals of JAVA Programming
L-T-P-C 3-0-2-5

Objective: This course is designed to provide knowledge of the essential features of Java. This course also provides the skills required to use Java libraries in order to develop efficient applications.

Course Content
Fundamentals of Java technology, modelling concepts: abstraction, encapsulation& packages, code reusability, define class, member, attribute, method, constructor& package, API online documentation Identifiers, Keywords, Types & Flow Control, Arrays: comments, valid & invalid identifiers, keywords, eight primitive types, literals, primitive variable & reference variable, variable declaration, Object creation, initialization, reference variables, instance & local variables, initialization of an instance variables, operators, legal & illegal assignments of primitive types, Boolean expressions & their requirements in control constructs, assignment compatibility & required casts in fundamental types, use if, switch, for, while& do constructions & the labeled forms of break & continue as flow control structures in a program. Declare & create arrays of primitive, class, or array types, array initialization, multidimensional array, copying one array to another.
Classes & inheritance: Class fundamentals, declaring objects, assigning object reference variables, constructor & method overloading, static variables, methods&
initializers, final classes, final methods & final variables, enumerated types, abstract classes & methods, the this keyword, garbage collection, using objects as parameters, argument passing, returning objects, recursion, Inheritance basics, using super, creating a multi level hierarchy, method overriding, dynamic method dispatch, using abstract, using final with inheritance, the object class. Packages, Interfaces, Exceptions & Assertions: Packages, access protection, importing packages, interfaces, define exceptions, use of try, catch & finally statements, exception categories, common exceptions, defining own exceptions, assertions, appropriate & inappropriate uses of assertions, enable assertions at runtime

Multithreading: Define a thread, creating separate threads, controlling the code & data that are used by that thread, thread execution, difficulties when multiple threads share data, inter thread communication, synchronization. Console I/O & File I/O Collections & Generics Framework, GUIs Using the Swing API & Events, Networking: Code to set up the network connection, TCP/IP, use of Server Socket & Socket classes to implement TCP/IP clients & servers

List of Experiments

1. Programs related to class, objects, command line argument, polymorphism, inheritance & function overriding
2. Programs related to super keyword
3. Programs related to constructors, this keyword, abstract class & final keyword
4. Programs related to packages, sub packages & interface
5. Programs related to following access controls w.r.t. to class: private, no modifier, protected, public
6. Programs related to following exception handlers: try-catch, try-finally, try-catch-finally, throws & throw
7. Programs related to different String & String Buffer/String Builder methods
8. Programs related to various I/O classes, interfaces & functions
9. Programs related to serializable & transient
10. Programs related to different methods of URL & Inlet Address class
11. Programs related to TCP & UDP
12. Programs related to various AWT & Swing components
13. Programs related to multithreading using Thread class & Runnable interface
14. Programs related to synchronization

**Text/Reference Books**
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-III

(Humanities & Basic Sciences Subject)

HU-251  
Business & Technical Communication  
L-T-P-C  
1-1-0- 2

Objective - To develop persuasive and professional communicative competence.

Course Content

Presentation Skills: Types of presentation; Effective strategies for oral presentations - audience analysis; organizing contents and use of media; Awareness of body language, time and space; Tone, variety of pitch, rate, volume and Articulation.  
Technical Report Writing: Characteristics & structure of a formal report; Classification & types of reports; Organization, Analysis & Interpretation of data; Revising & Editing especially in areas like abstracting/ summarizing as well as citations, references and bibliographies, check list for reports.

Text /Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-III

(Humanities & Basic Sciences Subject)

MA-251 Mathematics - III L–T–P–C 3–1–0–4

Objective: In this course the student is familiarized with some important Mathematical techniques used in various branches of engineering.

Course Content


Partial Differential Equations: First order partial differential equations; solutions of linear & nonlinear first order PDEs; classification of second-order PDEs; method of characteristics; boundary & initial value problems (Dirichlet & Neumann type) involving wave equation, heat conduction equation, Laplace’s equations & solutions by method of separation of variables (Cartesian coordinates); initial boundary value problems in non-rectangular coordinates.
Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-IV

(Departmental Core Subject)

EE-253 Measurements & Electronic Instrumentation 3-1-1-5

Objective: To get acquainted with construction & working of various types of electrical & electronic measuring instruments used to measure various quantities.

Course Content
Sensitivity of DC bridge, measurement of low & high resistances, DC potentiometer, principles of AC bridges for measurement of L & C; Instrument specifications & error analysis; Extension of Instrument range: CT & PT. dArsonval Galvanometer, moving coil meters, dynamometer type wattmeter & induction type energy meter. Electronic voltmeter, precision rectifiers, true r.m.s voltmeter; basics of digital measurements: A/D & D/A converters, programmable gain amplifier- auto-ranging; comparators & function generators; elements of digital multimeter; Hall effect sensor, clamp-on meter; solid state energy meter, frequency, phase angle & time period measurement. Cathode Ray Oscilloscope, Digital Storage Oscilloscope. Sample & Hold circuits, Data Acquisition Systems.

List of Experiments
1. Measurement of capacitance using De- Sauty Bridge
2. Measurement of self-inductance using Anderson’s bridge
3. Measurement of low resistance by Crompton potentiometer
4. Calibration of a voltmeter using Crompton potentiometer
5. Calibration of an ammeter using DC slide wire potentiometer
6. Measurement of Low resistance using Kelvin’s Double Bridge
7. Component Testing using CRO i.e. R, L & C
8. Measurement of a frequency using Wein’s bridge
9. Analysis of different waveforms using Function Generator
10. Measurement of Frequency & Phase using CRO

**Text/Reference Books**
Objective: To expose the construction, working Principle & performance of the various A.C. Machines.

Course Content
Three phase Induction machines: Constructional features & types; 3-phase distributed winding production of rotating magnetic field. Concept of slip; Phasor diagram & Development of equivalent circuit & derivation of torque equation, power flow diagram; Typical torque-slip characteristic & influence of different parameters on it; Methods of starting & speed control; Different types of braking circuit arrangement & qualitative explanation. No load & blocked rotor tests.
Synchronous machines: Constructional features & types; Operation of synchronous generators & motors connected to bus & phasor diagrams for normal, under & over excited conditions; Power & torque characteristics & capability curves. Parallel operation. Salient pole synchronous machine - phasor diagram & determination of synchronous reactances; starting & speed control of synchronous motors.
List of Experiments

1. Evaluation of parameters related to equivalent circuits using no load & blocked rotor test on a 3 phase induction motor. Drawing of the circle diagram & computing the following: (i) max. Torque (ii) current (iii) slip (iv) p.f. (v) efficiency
2. Performance of the load test on a 3-phase induction motor along with its characteristics: (i) speed vs load curve (ii) p.f. vs load curve (iii) efficiency vs load curve (iv) speed vs torque curve
3. Separation of transformer core losses & determination of the hysteresis & eddy current losses at rated voltage & frequency
4. Performance for the heat run test on a delta/delta connected 3-phase transformer & determination of the parameters for its equivalent circuit
5. Performance of Sumpner’s back-to-back test on 3 phase transformers, finding its efficiency & parameters for its equivalent circuits
7. Determination of losses & efficiency of an alternator
8. Plotting of the V-curve for a synchronous motor for different values of loads
9. Evaluation of $X_d$ & $X_q$ of a salient pole synchronous machine by slip test
10. Synchronization of an alternator across the infinite bus (RSEB) & summarization of the effects of variation of excitation on load sharing

Text/Reference Books

Objective: This course is to create awareness among students about measurement techniques & the use of industrial instruments.

Course Content

List of Experiments
1. Analyzing the characteristics of LDR with the distance of light source
2. Analyzing the characteristics of thermistor resistance with temperature
3. Determination of the speed (digital) with the help of photoelectric speed transducer
4. Analyzing the performance of digital to analog (D/A) converter
5. Analyzing the LVDT operation & its characteristics
6. Analyzing the angular displacement measurement using capacitive transducer
7. Analyzing the load measurement using strain gauge transducer
8. Analyzing the inductive pick up transducer
9. Analyzing the performance of piezo electric transducer
10. Analyzing the characteristics of thermocouple using Thermocouple Kit

Text/Reference Books
Detailed Syllabus for B. Tech. Degree Programme
in
Electrical Engineering

Semester-IV

(Departmental Core Subject)

EC-257
Signals and Systems

L-T-P-C
3-1-0-4

Objective: This course discusses continuous/discrete time signals and systems which are the basic tools used in analysis of the frequency and transform domain method.

Course Content
Introduction to signals and systems; Review of Fourier and Laplace Transforms; LTI system: Causality, stability, region of convergence; Classification and representation of signals, Concepts of linear vector space and orthogonal signal representation; Discrete signals: Sampling, digitization and reconstruction of analog signals; Fourier transform of discrete signals: DFT, z-transforms; Discrete systems, transfer functions and convolution; Random variables and processes: stationarity, ergodicity, correlation functions, power density spectra, Wiener-Khinchin theorem; functions of random signals; System response to random signals: Filtered random process a low pass and band pass; Basic concept of optimum filtering: Wiener Hopf filter.

Text/Reference Books
Objective: *This course is designed to develop the skill and knowledge required for designing digital circuits that are used in low cost, high speed, innovative and programmable devices for real time embedded applications.*

Course Content


Minimization Techniques: The K Map Method, Three, Four and Five-Variable Map, Product-of-Sums Simplification, Don't-Care Conditions, Quine Mccluskey Method NAND and NOR Implementation, Other Two-Level Implementations.

Combinational Logic Circuits: Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers and Demultiplexers.

Sequential Logic Circuits: Classifications & model of sequential circuits, latches, Flip-Flops, Level & edge triggering, Master-slave configuration, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure, Registers and
Counters, Registers-Shift Registers, Ripple Counters, Synchronous Counters, Other Counters.

Analysis & Designing Of Synchronous & Asynchronous Machines: Basic models of sequential machines, Concept of state, state diagram, state reduction through partitioning and implementation of synchronous sequential circuits, Asynchronous Sequential Logic Design.

Digital Logic Families & Programmable Logic: Characteristics of Digital ICs, TTL,ECL,MOS and CMOS digital IC families Characteristics, Comparison of Performances, Interfacing TTL and CMOS ICs, Display Drivers, Basic Concepts of Programmable Logic – PROM, EPROM, PAL, PLA.

List of Experiments
1. Verification of basic & universal logic gates
2. Designing of the half adder, full adder and verify the truth tables using logic gates
3. Designing of the half subtractor, full subtractor, & verifying the truth tables using logic gates
4. Designing and implementation of the code converter-I
5. Designing and implementation of the code converter-II
6. Designing of the 4-bit adder and subtractor, & verifying the truth tables
7. Designing and implementation of the magnitude comparator & verifying the truth tables
8. Designing and implementation of the multiplexer, & verifying the truth tables
9. Designing and implementation of the demultiplexer, & verifying the truth tables
10. Designing and implementation of the encoder, & verifying the truth tables

Text/Reference Books
Objective: This course discusses the basic concepts of linear control systems, their analysis & design.

Course Content
Modeling of physical systems: time-domain, frequency-domain & state-variable models; block diagram, signal flow graph & Mason’s gain formula; time & frequency response of first & second order systems; control system characteristics: stability, sensitivity, disturbance rejection & steady-state accuracy; stability analysis: Routh-Hurwitz test, relative stability, root locus, Bode & Nyquist plots; controller types: lag, lead, lag-lead, PID & variants of PID; controller design based on root-locus & frequency response plots; modern design techniques: canonical state-variable models, equivalence between frequency & time-domain representations, diagonalisation, controllability & observability, pole placement by state feedback, state feedback with integral control, observer & observer based state feedback control.

List of Experiments
1. Performance characteristics of a synchro transmitter-receiver pair & use these as a torque synchro & angular error detector
2. Performance characteristics of an angular position error detector using two potentiometers
3. Performance characteristics of a dc motor angular position control system
4. Performance of various types of controllers used to control the temperature of an oven
5. Performance characteristics of an analogue PID controller using simulated systems
6. Designing, implementation & determination of the effects of different cascade compensation networks for a given system
7. Performance characteristics of a small AC servomotor & determination its transfer function
8. Time response of a variety of simulated linear systems & their correlation of with theoretical results
9. Determination of the poles & zeros from the given transfer function & showing the pole zero configuration in s-plane
10. Plotting of the root locus for given transfer function
11. Determination of % unit step response of the system whose close loop transfer function is given
12. Determination of undamped natural frequency & %damping ratio, % overshoot of the response of a system whose open loop transfer function with unity feedback is given to a unit step input
13. Plotting of the bode plot for the given transfer function

Text/Reference Books
Objective: This course gives the knowledge about the Power System Components & their principles, working & protection.

Course Content

List of Experiments
1. Electromechanical under voltage relay using the under voltage relay demonstration panel & verification of the PSM & TSM settings of it
2. Electromechanical over voltage relay using the over voltage relay demonstration panel & verification of the PSM & TSM settings of it
3. Electromechanical over current relay using the over current IDMT relay demonstration panel & verification of the PSM & TSM settings of it
4. Operation of microcontroller based over current relay using VPL-01 module
5. Operation of microcontroller based unbiased 1- ph differential protection on transformer secondary relay using VPL-83 module
6. Characteristics of normal fuse, HRC fuse & MCB, MCB characteristics Trainer (VPL-03)
7. Earth fault relay during balanced condition & line to earth fault relay during balanced conditions
8. Operations of electro mechanical type an inverse time over current relay

Text/Reference Books
Objective: This course deals with different semiconducting devices, their characteristics & applications for various power applications.

Course Content
Introduction: need for power conversion with efficient, high frequency, lightweight converters; Power electronic converters classifications & scope; Power semiconductor switches: power/fast diodes, SCR, & transistors(BJT, MOSFET & IGBT) Ratings, static & dynamic characteristics, drive & switching aid circuits & cooling; isolation; protection; DC to DC conversion: Choppers: non-isolated: Buck, Boost & Buck-Boost converters; circuit configuration & analysis with; continuous & discontinuous loads; H-bridge converter multi-quadrant operation; isolated: forward, fly-back converters; example of a typical drive circuit; AC to DC conversion: Rectifiers: controlled/half-controlled/uncontrolled: single phase & three phase operation, Operation with R, R-L, back emf load; power factor, harmonics & effect of source inductance; Cascade operation; dual converters; a typical trigger / drive circuit; DC to AC conversion: Inverters: current source & voltage source inverters, active & reactive power handling; single phase & three phase voltage source & PWM inverters; PWM techniques; active front-end rectifier; a typical trigger / drive circuit; AC to AC conversion: Single phase AC static switches; transient-free switching of inductive loads; voltage regulators; cycloconverter.
List of Experiments

1. V-I characteristics of S.C.R. & determination of the Break over Voltage, Holding current & Latching current
2. V-I characteristics of a TRIAC in both directions & in different (1, 2, 3 & 4) modes of operation & determination of Break over voltages, Holding current & Latching current
3. Characteristics of DIAC
4. R triggering circuit of SCR– synchronized pulses to turn on SCR in Full Wave Rectifier with Resistive Load, to show load voltage & Triggering Pulse Waveform & to plot Average DC Voltage v/s Delay Angle
5. RC triggering circuit of SCR– synchronized pulses to turn on SCR in Full Wave Rectifier with Resistive & inductive Load, to show load voltage & Triggering Pulse Waveform & to plot Average DC Voltage v/s Delay Angle
7. Single Phase Half wave Controlled Rectifier - performance & waveforms of Single Phase Half wave Controlled Rectifier
8. Single Phase Fully Controlled Bridge Rectifier - performance & waveforms of Single Phase Fully Controlled Bridge Rectifier
9. Simulation of problems on Buck Converters
10. Simulation of problems on Boost Converters
11. Simulation of problems on Buck-Boost Converters

Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-V

(Departmental Core Subject)

EE-354 Utilization of Electrical Power

L-T-P-C 3-0-0-3

Objective: This subject deals with various areas of industrial utilization of electrical energy such as illumination, electric heating, welding, traction system etc.

Course Content

Tariff: one part, two part; Availability based tariff: rate, objective, implementation; Perspective of industrial energy conservation; Illumination: sources of light, electronic control of light, illumination of interiors, exteriors, special areas (sports complex, airport etc.), laws of illumination, design of illumination systems by point-to-point method, average method; Electric drives: review of motor & load characteristics, four quadrant drives, mechanical coupling, referred inertia & torque, steady state stability, selection of motor rating; Industrial drive application examples: pump drives, rolling mill drives, types (VSI, CSI & cyclo converter based), basic principle of operation, torque speed characteristics, closed loop control; Traction drives: basic traction requirements, specifications, different configurations & components of electric traction drives, rating calculations, economic aspects; Electric vehicle drives: pure & hybrid electric vehicles, series & parallel hybrid configurations, range & power, battery storage calculations, battery, motor & drive selections, IC engine power calculations, power splitting devices, control techniques; Industrial heating: different methods of heating-comparison; Application areas: resistive, induction, microwave (dielectric), infrared, representative details of each type.
Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in
Electrical Engineering

Semester-V

(Departmental Core Subject)

EC-352 Digital Signal Processing

Objective: This course discusses the methods of analyzing discrete time signals & systems, & the methods required for transforming & processing digital signals used in high speed speech & image processing

Course Content

List of Experiments
1. Verification of the sampling theorem
2. Impulse response of a given system
3. Linear convolution of two given sequences
4. Circular convolution of two given sequences
5. Autocorrelation of a given sequence & verification of its properties
6. Cross correlation of given sequences & verification of its properties
7. Solving a given difference equation
8. Computation of N point DFT of a given sequence & plotting of the magnitude & phase spectrum
9. Linear & circular convolution of two sequences using DFT & IDFT
10. Implementation of FIR & IIR filter to meet given specifications

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-VI

(Departmental Core Subject)

EE-355 Advanced Electrical Machines

Objective: This course discusses dynamic & steady state performance analysis of various electrical machines.

Course Content
Transformer: Three winding transformer; Unbalanced operation of three phase transformer; Switching-in transients & mechanical forces. Electromechanical energy conversion: Field energy- energy & co-energy; Torque/force in a singly excited & multiple excited electromechanical systems & applications, AC windings. Circuit analysis of electrical machines: Development of circuit models from dc machine & synchronous machine. Impedance matrix; instantaneous & phasor variables; real-coil & pseudo-stationary coil, expressions for torque & power, transformation of variables with power invariance, examples; general two-axis machine. Extension of two-axis models to different machines. D.C machines: Flux & mmf waves; Commutation & armature reaction; Dynamic equations, block diagrams & transfer functions. Induction machines: Deep-bar & double-cage construction; Machine equations in stationary reference frame (d-q axis model), dynamic & steady state performance, behavior under asymmetrical supply voltages. Synchronous machines: Winding inductances; Machine equations in rotor reference frame (d-q axis model); Sudden three phase short circuit & transient circuit model; Steady state operation; Synchronous machine dynamics. Reluctance Machines: Synchronous reluctance, stepping motors & switched reluctance machines,
principles of operation & models for operating characteristics. Steady-state & dynamic performance. PM machines: Permanent magnet material, Basic analysis of magnetic circuit with permanent magnets, Steady-state & dynamic performance of PM synchronous machines & Brushless DC machines.

Text/Reference Books
Objective: This course deals with study of various AC & DC industrial drives, their application & control.

Course Content
Drive concept, four quadrant drive & load characteristics, selection of motor, control & stability of electric drives, feed back control of drives, thermal effects in electrical machines; DC motor drive: Dynamical model of separately excited dc motor, control of a separately excited dc motor, current, flux & speed controller design; control loop containing an electronic power converter: dc drive with line-commutated converter, dc drive with high frequency PWM converter.

List of Experiments

1. DC motor speed controller for open & close loop
2. Single phase fully controlled bridge converter fed DC motor
3. Speed control of single phase induction motor using microcontroller
4. Single phase half controlled bridge converter fed DC motor
5. MOSFET based chopper Dc motor controller
6. Speed control of three phase slip ring motor using static rotor resistance control through rectifier & chopper
7. Performance of single phase dual converter in non-circulating mode as well as in circulating mode using microcontroller
8. Speed control of separately excited DC motor using chopper
9. Speed control of slip ring induction motor by scherbius slip-power recovery scheme

Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VI

(Departmental Core Subject)

EE-357  
Power System Analysis & Operation

L-T-P-C  
3-1-0-4

Objective: This course deal with study & analysis of power flow for security & reliability consideration.

Course Content


Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VI

(Departmental Core Subject)

EE-358 Control & Electronic System Design L-T-P-C 0-0-2-2

Objective: This course deal with practice of designing various kind of electronic & electrical system.

Course Content

Design assignments to be provided by teacher on broad areas listed below.

Design of a practical control system including aspects such as: Aspects of plant, actuator, sensor & disturbance modeling; Controller design from specifications & including typical factors, such as control limit & rate constraints.

Design of the feedback subsystem including electronic signal conditioning. Design of electrical actuation systems such as ones based on Power Electronic Circuits. Simulation of such systems on MATLAB.

Design of signal processing systems including aspects such as: Development of Filter specifications from practical considerations, Design of Filter transfer function & analog circuit realization Realization of digital filter algorithms & associated circuit designs such as amplifiers, ADC, Sample & hold circuit, Anti-aliasing filter etc. Development of the digital filter code on a suitable embedded hardware platform such as microcontroller,DSP. Design of measurement systems including aspects such as : Development of specifications from practical considerations of the measurement application Design of interface subsystem for achieving measurement accuracy, Noise related issues, such as shielding, guarding, grounding ii. Compensation issues related to power supply & temperature effects, nonlinearity iii. Calibration, zero & sensitivity adjustment Computing system measurement related specifications based on component level specifications available in electronic data sheets

Data Acquisition system for PCs. Microprocessor-based Industrial Automation including aspects of Industrial grade single-loop PID controller realization with features to address
integral wind-ups, auto-manual transfers, auto-tuning etc. PLC based system design including RLL programming Simple embedded controllers with features such as remote wireless command for applications such as home automation.

List of Experiments
1. Designing of an automatic street light control system using LDR & transistor BC-548
2. Designing of a water level indicator alarm using PCB & various sensors
3. Designing of a portable mobile charger on PCB using transistor PNP 7805
4. Designing of a power supply using PCB & various components
5. Designing of a fire alarm on PCB
6. Designing of occupancy light indicator system using transistor C1815
7. Designing of clap switch using transistor BC547
8. Designing of electricity detector using IC VW64
10. Designing of rain alarm using transistor BC548 & TL188

Text/Reference Books
Objective: Embedded system provides cost effective solution for industrial, consumer & space applications. The objective of teaching this course to the student is to train them to learn all aspects of hardware & software development to design embedded system for various applications

Course Content
Networks: distributed embedded architectures: networks abstractions, hardware & software architectures; networks for embedded systems: I2C bus, CAN bus; examples. Case studies: Inkjet printer, telephone exchange, etc.

**List of Experiments**

1. ARM7 LPC2148 Trainer kit
2. Keil IDE overview – Project creation, downloading & debugging
3. Writing an assembly language program for:
   (a) Using assembler directives   (b) Factorial calculations
4. Writing an assembly language program for:
   (a) Swapping Register Contents   (b) Compare & Loop    (c) Shifting of data
5. Writing an assembly language program for addition of two 32-bit numbers use of subroutine
6. Writing an assembly language program for copy block
7. Writing an assembly language program for Hex to ASCII conversion
8. Writing an assembly language program for Larger of two numbers
9. Writing an assembly language program for GPIO programming
10. Writing an assembly language program for:
   (a) Copy word        (b) Stack operation
11. Writing programs for examples on the ARM LPC2148 trainer kit.

**Text/Reference Books:**

Summer Internships offer students personal & real world spirits & exposes to an actual working life, an experiential foundation to their career choices & the chance to build valuable business networks. Under this programme each student undergoes training in an Industry for a minimum period of six weeks during the summer vacation after VI Semester. Through the internship students are exposed with the various processes involved at any typical industrial unit such as, operating procedure, construction processes, management procedures etc. & have the opportunity to relate with the knowledge they acquired in the classroom. Students execute a small project based on any of the above mentioned aspects under the supervision of competent personnel in the industry & a faculty member of the university.

After completion of the Internship, students are required to prepare a report, based on the activities performed during the internship, as per the prescribed format/ guidelines. The report should be certified by the Supervisors, & presented in the form of a seminar in the VII Semester.

Evaluation of the Summer Internship will be done as per the approved procedure.
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Departmental Core Subject)

EE-451
Power Apparatus & System Design
L-T-P-C 3-0-1-4

Objective: This course deals with electrical & mechanical design & analysis of power system & transmission system planning & in-depth analysis of balanced & unbalanced faults, construction of overhead lines & factors affecting transmission line route selection.

Course Content

List of Experiments
1. String efficiency mathematical calculation & program
2. Sag mathematical calculation for same level supports & program
3. Sag mathematical calculation for different level supports & program
4. Inductance mathematical calculation for single circuit 3 ph line & program
5. Inductance mathematical calculation for double circuit 3 ph line & program
6. Self GMD mathematical calculation & program
7. Mutual GMD mathematical calculation & program
8. Voltage regulation mathematical calculation & program
9. Capacitance mathematical calculation & program
10. Transmission efficiency mathematical calculation & program
Text/Reference Books


Objective: This course deals with typical configuration of HVDC converter stations, various links & about FACTS technology used for high voltage transmission.

Course Content

List of Experiments
1. Simulating a simple circuit with PSCAD software
2. Simulating different types of fault occurs in three phase transmission line
3. Simulating the 1-phase half controlled rectifier circuit with R & RL load & obtaining the corresponding waveforms using PSCAD
4. Simulating the 1-phase full controlled rectifier circuit with R & RL load & obtaining the corresponding waveforms using PSCAD
5. Simulating the 3-phase full controlled rectifier circuit with R load & obtaining the corresponding waveforms using PSCAD
6. Simulating the operation of buck & boost converter with PSCAD
7. Simulating the simple Voltage Source Inverter & obtaining the corresponding waveforms using PSCAD
8. Analyzing the power quality of diode bridge rectifier using PSCAD
9. Simulating the 3-phase full controlled converter for analyses of harmonics generated by it using PSCAD
10. Analyzing the power flow & power factor in 3-phase AC circuit using PSCAD

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Departmental Core Subject)

EE-455 Comprehensive Viva Voce

The knowledge gained by the students during their B.Tech programme will be evaluated through a Comprehensive Viva Voce Test in the VII Semester. The test will cover the entire syllabi of the B.Tech degree programme. Preparation for the Comprehensive Viva Voce Test will also help the students in their placement activities. The evaluation will be done as per the approved procedure.
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Departmental Core Subject)

EE-460
Minor Project

L-T-P-C
0-0-3-3

Students undertake project work to develop the skill and aptitude of problem-solving. The project work is divided into two parts: Minor and Major. The Minor project is to be undertaken in the VII Semester.

Students will choose an area of their interest in consultation with a faculty member of the department, who will act as the Supervisor. The area of interest could be confined to his/her discipline or may be interdisciplinary.

The project work will involve all or some of the following processes: identification of problem, study of related literature, data collection and analysis, theoretical formulation, fabrication, experimentation and result analysis.

The preliminary work such as problem identification through literature survey, field survey etc. and preparation of plan of execution should be complied in the form of a report, in the prescribed format/guidelines. The report, duly certified by the Supervisor, should be submitted to the Head of the Department.

Progress made by students will be continuously monitored and evaluated as per the approved procedure.
Objective: The aim of this course is to sensitize students towards professional ethics, values, & associated aspects. It initially addresses concerns relating to product & service quality & then moves on to ethical aspects of organizational functioning. The course throws light on ethical issues & crimes that are likely to remain at the core of corporate concerns & discusses intellectual property related issues that are the need of modern industrial & business enterprises.

Course Content
Role of Corporations: Some big changes in the world in last 60 years (WW II, GATT, WTO) & impact on business, Need for strategic planning & process management, Business strategies & challenges in leading global organizations.
Quality Management: Quality as a strategic imperative, Evolution of quality management, Distinction between quality control, quality assurance & quality management, International standards (ISO family of standards) & International models for quality management, quality in services, enhanced focus on accreditation, the accreditation process, standards for key services (food processing: HACCP & education: NAAC).
Ethics & Human Values: Ethics & morals values, Ethical theories, Common features of unethical companies & leaders, Professional ethics, Professional Codes of Ethics, Benefits & limitations of code of ethics, Corporate social responsibility & its business implications.

Environmental & Health Concerns: Introduction, Manufacturing in the 21\textsuperscript{st} century, Resource conservation, the social costs of environmental destruction (land, water & air pollution), ISO 14000 standards & approaches to environmentally friendly technology, carbon trading, international treaties & their limitations.

Texts / Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Humanities & Basic Sciences Subject)

HU-451 Interview Skills L-T-P-C 0-0-1-1

Objective: To understand the intricacies of interview & develop skills to perform satisfactorily.

Course Content

SWOT Analysis.

Significance of Etiquette, Grooming, Kinesics, Paralanguage & Proxemics in interviews.

Résumé, Cover letter, Thank you Letter, Job Acceptance Letter.

Interview types, Open-ended, Behavioural & Hypothetical questions, FAQs.

Group Discussion & Interview sessions.

Text/Reference Books

Objective: To introduce certain topics from quantitative aptitude with emphasis on analytical ability & computational skills needed in competitive examinations. This module would also train the students to solve quantitative aptitude problems during the placement drives.

Course Content

Problems on Alligation or mixture.
Problems on Ages.
Problems on Clock.
Problems on Calendar.
Problems on Speed, Time and distance.
Problems on Time and Work.
Problems on Heights and distances.
Problems on Trains.
Problems on Boats and Streams.
Problems on Pipes and Cisterns.

Text/Reference Books

3. 
Objective: The explosive growth of the “Internet of Things (IoT)” is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products at home and office environment. This course provides an overview of key concepts and challenges related to digital transformation. The course examines the evolution of the Internet and how the interconnection of people, processes, data and things is transforming every industry. In this course, the importance of IoT in society, the current components of typical IoT devices and trends for the future, IoT design considerations, constraints and interfacing between the physical world and IoT devices will be covered. The course all covers how to make design trade-offs between hardware and software, key components of networking to ensure that students understand how to connect their device to the Internet. This course helps students to understand the concepts of Internet of Things so that they can be able to build IoT applications.

Course Content

Introduction – Concepts and Technologies behind Internet of Things (IOT)
Welcome to IoT, Elements of IoT, Introduction to the IoT Systems, Introduction to configuring things, Network of physical objects embedded with sensing, Programming in IoT, Prototyping, systems and interconnection, Prototyping ideas for IoT and study with case studies, Embedded Systems, Computer Networks, M2M (Machine to Machine Communication, Internet of Everything (IOE), Concepts & Definitions: Identification, localization, wireless protocols, data storage and security; Collecting, communicating, coordinating, and leveraging the data from connected devices;
Understand how to develop and implement IOT technologies, solutions, and applications. Machine Learning, Distributed Computing, Artificial Intelligence, Transitioning to the IoT, IoT connections, Implementing an IoT solution, security in IoT, Modeling an IoT solution, M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT—the global context, M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies, A use case example, Differing Characteristics.

**IOT Reference Architecture**

Internet of Things computing and communication capabilities, State of the art Architecture, Reference Model and architecture, IoT reference Model, IoT Reference Architecture, Design and develop IOT devices, IOT Network Architecture, IOT Device Architecture, IOT Application Architecture, Client Server vs Publish Subscribe Architecture, Internet of Things (IoT) and Web of Things (WoT), Internet and Web Layering, Business Aspects of the Internet of Things, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views, M2M to IoT – An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations, M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

**IOT Device Design**

IOT Communication Protocols


Programming Languages & IDEs

Java interfacing, Python for IOT implementations. Assembly, C/C++, Python / IDLE, Pycharm, Micropython, LUA.

Cloud Computing


Optimizing power consumption of IOT Devices

Power consumption of IoT, hardware components, application and communication protocols, configuring extended battery life, Performance and power consumption, Selections of MCUs and communication interfaces, Power management plan of the IOT device addressing complexities at various level, Application's complexities, Computing system's complexities – Microprocessor architecture, Communication system's complexities.

IOT Analytics

IOT real-time data analytics, IOT data streams and databases, Tracking and managing of IOT assets, Representational State Transfer (REST) and Activity Streams, Making Things Smart: Getting Things onto the Internet, Business Cases & Concepts, Business Issues and Models, Persuasive Technologies & Behavioral Change, Big Data and Semantic Technologies. Data Analytics, Data Visualization and tools in IOT, Predictive

List of Experiments:

1. Introduction to IoT devices
2. Characteristics of IoT devices
3. Physical design of IoT devices
4. Logical design of IoT
5. Functional blocks of IoT devices
6. Communication models & APIs
7. Bay Area Rapid Transit (BART) API using Python, JavaScript and jQuery
8. Introduction to Python
9. Introduction to Software define Network (SDN)
10. Network & Communication aspects of IoT
11. Wireless medium access issues of IoT
12. MAC protocol survey and Survey routing protocols
13. Sensor deployment & Node discovery of IoT
14. Data aggregation & dissemination of IoT
15. Design challenges in IoT
16. Development challenges in IoT
17. Security challenges in IoT
18. Domain specific applications of IoT
19. Home automation using IoT
20. Industry applications using IoT
21. Surveillance applications using IoT
22. Developing IoT devices using visual programming and python
23. Introduction to different IoT tools
24. Developing applications through IoT tools
25. Developing sensor based application through embedded system platform
26. Implementing IoT concepts with python
27. Analyze IoT Process using controlled system
28. Open and closed loop control system
29. Process diagram of IoT using sensors, actuators and Microcontrollers
30. PL-App with Arduino and Raspberry Pi
31. Introduction to Cisco Meraki - Cloud-Managed Security
32. Power plant Earthquake Emergency Shutdown System - Case study on IoT
33. Record sunrise and sunset using IFTTT - case study on IoT application development
34. Representational State Transfer (REST) and Activity Streams
35. Project work on IoT

Text Book:


Reference Book:

Detailed Syllabus for B. Tech. Degree Programme in
Electrical Engineering

Semester - VII

(Departmental Core Subject)

CS-463 Programming Concepts L-T-P-C 0-0-1-1

Objective: This course is designed to provide knowledge of the essential features of C, C++, Java and Excel.

Course content:
Decision making statement & operator based programs, Loop based programs, Multi way decision making statement based programs, Array, String, Function, Structures, Pointers, Files, Imperative Languages, Functional programming, data abstraction, polymorphism, semantics, implementation issues, Declarative programming, Object-oriented programming with objects, classes & instances, Programming concepts in JAVA, advanced applications in Excel

List of Experiments:

1. Decision making statement and operator based programs
2. Loop based programs
3. Multi way decision making statement based programs
4. Array and string based programs
5. Function based programs
6. Structure based programs
7. Pointers based programs
8. File handling based programs
9. Programs related to classes & objects
10. Programs related to constructors & destructors
11. Programs related to operator overloading & type conversion
12. Programs related to Inheritance
13. Programs related to virtual functions & polymorphism
14. Programs related to managing data files
15. Programs related to exception handling

16. Programs related to class, objects, command line argument, polymorphism, inheritance & function overriding
17. Programs related to following access controls w.r.t. to class: private, no modifier, protected, public
18. Programs related to various I/O classes, interfaces & functions
19. Programs related to synchronization
20. Hands on practicals in Excel

Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-VIII

(Departmental Core Subject)

EE-470   L-T-P-C
Major Project    0- 0-4-4

After completion of the Minor Project, students shall undertake the Major Project in the VIII Semester. The idea conceived in the Minor Project shall be executed in this semester under the supervision of the faculty member. Students shall complete the practical aspect of the project. Thereafter they will prepare a report, as per the prescribed format/ guidelines, incorporating the results, their analysis & interpretation. The report, duly certified by the Supervisor, should be submitted to the Head of the Department.

Progress made by the student will be continuously monitored & evaluated as per the approved procedure.
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VI

(Departmental Elective - I)

EE-365 Power Systems Transients & Protection  L-T-P-C  3-0-0-3

Objective: To analyze the various type of transients in power system & about protection schemes.

Course Content


Text/Reference Books

**Objective:** This course deals with production & measurement of high voltages in power system.

**Course Content**

**Text/Reference Books**
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VI

(Departmental Elective - I)

EE-367 Machines Analysis
Pre-requisite EE-254

L-T-P-C 3-0-0-3

Objective: This course deal with principle, modeling, equivalent circuit & performance analysis of various electrical machines.

Course Content
Principles of electromagnetic energy conversion: General expression of stored magnetic energy, co-energy & force/torque, example using single & doubly excited system; Calculation of air gap mmf & per phase machine inductance using physical machine data; Voltage & torque equation of dc machine, three phase symmetrical induction machine & salient pole synchronous machines in phase variable form; Introduction to reference frame theory: static & rotating reference frames, transformation relationships, examples using static symmetrical three phase R, R-L, R-L-M & R-L-C circuits, application of reference frame theory to three phase symmetrical induction & synchronous machines, dynamic direct & quadrature axis model in arbitrarily rotating reference frames, voltage & torque equations, derivation of steady state phasor relationship from dynamic model, generalized theory of rotating electrical machine & Kron's primitive machine; Determination of synchronous machine dynamic equivalent circuit parameters: standard & derived machine time constants, frequency response test; Analysis & dynamic modeling of two phase asymmetrical induction machine & single phase induction machine; Permanent magnet synchronous machine: Surface permanent magnet (square & sinusoidal back emf type) & interior permanent magnet
machines, construction, operating principle & true synchronous characteristics, 
dynamic modeling & self controlled operation; Analysis of Switch Reluctance Motors: 
design trade-off & basic operating characteristics.

Text/Reference Books

Objective: This course is about various applications of high voltage engineering used in the industries like electrostatic separation, hardening of materials etc.

Course Content

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-VI

(Departmental Elective - II)

EE-369 Control Theory L-T-P-C 3-0-0-3
Pre-requisite EE-351

Objective: This course is about state space analysis of various systems with consideration of initial conditions of the system.

Course Content
sense of Lyapunov, asymptotic stability of linear time invariant continuous & discrete
time systems. Solution of Lyapunov type equation. Model decomposition & Decoupling
by state feedback. Disturbance rejection, sensitivity & complementary sensitivity
functions, internal model control (IMC).

Text/Reference Books
   Publisher. Jan 2006.
Objective: This course discusses the various advanced technologies of power electronics used for the controlling of electrical machines.

Course Content
Drive Concept: different machine & load characteristics, equilibrium & steady state stability, four quadrant operation, referred inertia & load torque for different coupling mechanism, thermal selection of machines; Separately excited dc motor drive: operating limits using armature voltage control & field control techniques, dynamic model/armature voltage control only) of machine & converters (continuous conduction only), open-loop dynamic performance, starting & reversal time, energy consumption, closed loop control using single (speed) & two loops (speed, current), implementation using circulating current type three phase dual converter & four quadrant transistorized chopper. State feedback control & sliding mode control of separately excited dc machine, modeling & control of separately excited dc machine in field weakening region & discontinuous converter conduction mode, control of dc series machine; Review of variable frequency operation of three phase symmetrical induction machine: scalar control methods (constant volts/Hz & airgapflux control), vector control of induction machine, methods of flux sensing/estimation, implementation of IRFO scheme using current controlled PWM VSI, implementation of DSFO scheme using GTO CSI, effect of...
machine parameter variation on the performance of vector controlled induction motor drive, speed sensorless control, flux observation, Direct Torque Control; Speed control of wound rotor induction motors: static rotor resistance control, static Scherbius drive using line commutated converter cascade, harmonics & power factor, vector control of wound rotor induction machine using self commutated converter cascade & improvement in power factor, introduction to variable speed constant frequency (VSCF) generation; Control of wound field synchronous machine: constant volts/Hz control, scalar self control (commutatorless motor), vector control; Control of permanent magnet synchronous machine: Brushless dc machine, surface permanent magnet machine & interior permanent magnet machine control; Introduction to speed control of Switched Reluctance machine.

Text/Reference Books

Objective: This course discusses operating principle, waveform, switching trajectory losses & control of various converters.

Course Content
Switched Mode Power Supply: Forward & flyback converter circuit, operation, waveforms & design, transformer design for power supplies, small signal analysis of DC-DC converters & closed loop control; Resonant DC-DC converters: operating principle, waveforms, switching trajectory & losses & control; PWM inverter modulation strategies: sine wave with third harmonic, space vector modulation & predictive current control techniques, Dynamic braking circuit, input side bidirectional power flow requirement for regeneration, Dual thyristor bridge & PWM rectifier; Three level inverter: basic topology & waveform, improvement in harmonics & high voltage application; Resonant ac link/dc link inverters; Cycloconverters: Circuit, operating principle, control, harmonics, power factor & applications; Non-drive application of power electronic converters: back to back HVDC transmission, induction heating, electronic ballast, UPS, static var compensators & active filters. Industrial PWM driver chips for power supplies such as UC 3843, 3825 or equivalent; Industrial gate driver chips for PWM voltage source inverters with isolation & protection circuits. Intelligent power modules.

Objective: This course discusses the power system dynamic study of small signal & large signal stability. Optimal operation of power system & modeling of synchronous machine.

Course Content

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Departmental Elective - III)

EE-458 Non Linear Control L-T-P-C 3-0-0-3

Objective: This course is about causes, analysis, stability theories & design of non linear system.

Course Content
state mode. Some design examples of nonlinear systems such as the ball & beam, flight control, magnetic levitation & robotic manipulator etc. Approximate solution of nonlinear system using the perturbation method & averaging method.

Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-IV

(Open Elective - I)

HU -252 Language through Literature & Films

L-T-P-C 0-2-0-2

Objective: To introduce the nuances of English Literature & develop reflective, creative & literary abilities.

Course Content

The Eyes Have It - Ruskin Bond
Appro JRD – Sudha Murthy
Bacon - Of Study; Of Youth & Age
Douglas Malloch - Be the best of whatever you are
Rabindranath Tagore - Where the mind is without fear
Enhancement of emotional, creative & social quotient through viewing & discussions on selected films

Text/Reference Books

BM-270 Foundations of Economic Science 2-0-0-2

Objective: The objective of this course is to teach basic principles of consumption, production, exchange, distribution of remuneration to factors, pricing and public finance. Further, students are provided knowledge on completion of projects by optimizing production with limited resources and also to know infrastructure and development needs of a country to perform tasks accordingly.

Course Content
Engineers & Economics: Meaning of economics, why engineers should know economics, important basics: consumption, production, exchange, distribution & public finance, cost of production & revenue through sales.

Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-V

(Open Elective - II)

HU -351  L-T-P-C  0-2-0-2
Fun with Drama

Objective: To stimulate imagination, cultural enrichment & explore multidimensional use of language through drama.

Course Content
Script writing: Story, structure, character development, dialogue, visuals & language with emphasis on critical & analytical thinking, problem-solving & communication skills
Direction: Techniques & art of play direction with emphasis on methods of actor coaching, rehearsal procedures & presentation of several scenes of varying dramatic styles
Enactment: Controlled use of body & voice, analysis & interpretation of roles, characterization & emotional projection
Analysis: Insightful analysis of various aspects of translating a play from script to stage, director’s concepts, visual composition, attention to character development & narrative structure & power of the unspoken word

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-V

(Open Elective - II)

BM-370 Marketing Management L-T-P-C 2-0-0-2

Objective: Marketing is no longer a department charged with a limited number of tasks-it is a companywide undertaking. Marketing succeeds only when all departments work together to achieve goals. The syllabus is designed to serve as an introduction to the theory & practice of marketing to the engineering students. It will help them develop competencies in the use of the modern marketing techniques & their applications in design, development & commercialization of new products & services in the rapidly changing markets.

Course Content
Introduction: Nature & scope of marketing; Importance of marketing as a business function; Marketing concepts – traditional & modern; Selling vs. marketing; Marketing mix & environment, Marketing Myopia.
Consumer Behaviour & Market Segmentation: Significance of consumer behavior; Market segmentation; concepts & importance; Bases for market segmentation,
Branding: Role of brand & its Significance, Types of Brands, Challenges for Brands, Brand Equity
Price: Importance of price in the marketing mix; Factors affecting price of a product/service Distributions: Distribution channels; concept & role; Types of distribution channels; Factors affecting choice of a distribution channel.
Communications: Techniques of promotion; Integrated Marketing Communications; Advertising: Role & Significance. Media & their relative merits & limitations, Public Relations & Personal Selling.

E-marketing management: Overview of e-commerce, E-marketing: Role of IT in marketing, E-Marketing-mix, Emerging technology trends & their implications for marketing, Social media & marketing, E-CRM & building relationship.

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-VII

(Open Elective - III)

BT-471 Bioprocess Technology

L-T-P-C 3-0-0-3

Objective: A bioprocess is a specific process that uses complete living cells or their components to obtain desired products which is an importance part of biotechnology industry. This course is designed to make a learner efficient in bioprocess calculations and to impart knowledge of different technology used in bioprocess

Course Content

Bioprocessing v/s chemical processing, Substrates for bioconversion processes
Inoculum development. Process technology for production of primary metabolites: such as baker’s yeast, ethanol, citric acid, amino acids, polysaccharides & plastics, Microbial production of industrial enzymes such as glucose isomerase, cellulase, amylase, protease etc., Production of secondary metabolites: penicillin & cephalosporin etc.

Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Open Electives - III)

CE-462
Air Pollution & Industrial Waste Management

Objective: To give understanding of air pollution and its impact, modeling of dispersion of pollutant, control measures, types of waste from different industries and their management.

Course Content
Air Pollutants, their sources and harmful effects on the environment; Meteorology as applied to air pollution and dispersion of air pollutants, Air quality and emission standards, Removal of gaseous and particulate matter. Sources and types of wastes; solid, liquid and gaseous wastes; Water use in industry, industrial water quality requirements; Control and removal of specific pollutants in industrial wastewaters from dairy, fertilizer, distillery, tannery, sugar, pulp and paper, iron and steel, metal plating etc.

Texts/Reference Books
   Addison-Wesley. 1971.
   1999.
Objective: The course aims at acquainting students with the fundamentals of Information Systems and their application in the various areas of business. It also provides an overview of the emerging domain of e-commerce, its concepts, issues & technologies.

Course Content


E-commerce: Introduction, Definition of e-commerce, emergence of Internet, commercial use of Internet, history of e-commerce, advantages & disadvantages of e-commerce

Enabling technologies: Internet Client server applications, networks, Uniform Resource Locator (URL), search engines, software agents, Internet Service Providers(ISP), broadband technologies, Electronic Data Interchange(EDI).
E-marketing: characteristics, methods, e-marketing value-chain, site adhesion, browsing behavior model, e-advertising, e-branding, e-marketing strategies

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Open Elective - III)

EC-475

Computer Networks

L-T-P-C 3-0-0-3

Objectives: To discuss the principles of data communication, the functions of different layers, IEEE standards employed in computer networking and the different protocols and network components.

Course Contents
Fundamentals of Communications and Networking: Network Topology, LAN, Network node components- Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology, Communications protocols. Basic Concept of layering & connection oriented & connection less services, Network structure and architecture, the OSI reference model, TCP/IP Architecture, Networks topology, OSI NETWORK MANAGEMENT: OSI Network management model – Organizational model – Information model, communication model, OSI and TCP/IP Model design issues, Layers of OSI and TCP/IP Model, Data Link Layer and Data link layer protocols: Elementary data link protocols, Sliding windows protocols, Error handling, Parity Bit Check, CRC, Checksum, Hamming Code, Hamming Distance, Overview of High Level Data Link Control (HDLC) and Ethernet, Network Layer: IP Header (IPv4 and IPv6), IP addresses – Calculating IP address and design, TCP/IP packet, ICMP, ARP, RARP, IGMP. Interior Gateway routing Protocol: OSPF, Exterior Gateway Protocols: BGP.

protocol, TCP segment Header Format, TCP window Management, TCP Timer Management.

Application Layer (services and protocols): WWW, Hyper Text Transfer Protocol, Domain Name System (DNS), Electronic mail (SMTP, POP, IMAP), File Transfer Protocol (FTP, TFTP).

Text/Reference Books:

EE-465  L-T-P-C  3-0-0-3
Energy Conversion Process

Objective: To get acquainted the students with various energy conversion processes used in non conventional energy sources.

Course Content
Physics of photovoltaic energy conversion in P-N junctions. Effect of physical properties of photovoltaic converters; Performance characteristics of different types of photovoltaic devices; Design considerations & manufacturing processes; Regulations & efficiency of conversion. Charge carriers & thermoelectric phenomena; Thomson, Peltier, Seebeck effect; Kelvin’s relations; Thermoelectric energy conversion; Materials, size & capacity; Performance analysis & optimized design of thermoelectric devices. Physics of thermionic emission; Operation of high level vacuum & low pressure thermionic converters; Vacuum & gas-filled converters; Thermionic nuclear reactors; Heat pipes. Basic principles of Magnetohydrodynamic power generation; Hall effect; Ionization & seeding; Faraday, Segmented electrode, Hall & Cross-connected generators, Open & closed cycles; Liquid metal MHD. Fuel cells, Thermodynamics of Fuel Cells. Performance Analysis. Low, medium, high temperature Fuel Cells.

Text / Reference Books
(Green Energy & Technology) Sumathi S., L. Kumar Ashok & Surekha P. Springer. 2015.
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Open Elective - III)

MA-451 Probability Theory 3–0–0–3

Objective: In this course the student is familiarized with the basics of probability & stochastic processes.

Course Content

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Open Elective - III)

ME-465 Solar Energy & Applications  L-T-P-C  3-0-0-3

Objective: This course discusses solar energy as an important alternative to conventional sources of energy-its generation & utilization.

Course Content

Texts / Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VII

(Open Elective - III)

PH-451 Nanotechnology

Objective: The objective of this course is to discuss why & how changes occur in the properties of bulk materials when their size approaches a billionth of a meter & to understand the basics of nanostructures, nanotubes, nano-electronic devices, nanobiotechnology, nanomachines etc.

Course Content
Basics of low dimensional (0D, 1D, 2D) structures, Quantum dots wires & wells, Nanoparicles-free & dispersed, Nanocrystalline & nanostructured films, Self-organized structures; Nanostructures for optical & electronic applications, Quantum dot diodes, lasers & detectors, Single electron devices & logic applications, Optical computing & Information processing; Carbon based nanostructures, Electrical, mechanical & chemical properties of carbon nanotubes, Sensors & drug delivery vehicles, Data processing; Bulk nanostructured material & Photonic crystals; Nanostructures for Magnetic applications, Giant & Colossal Magnetoresistance. Nanostructured ferromagnetism, Random Access Memories; Nanostructures for catalysis & hydrogen storage, Nanoclays, colloids & hydrogen storage nano materials. Organic & Biological nanostructures. Nanomachines & supra molecular devices.

Text/Reference Books

SPSU/SOE /EE/B.Tech./2017 Ver. 2.0 128
Objective: The objective of this course is to introduce the importance of nonlinearity & its ubiquity in engineering systems. The various techniques/tools used to understand the dynamics of nonlinear systems with examples from various engineering disciplines shall be discussed.

Course Content
Introduction to chaos. Various examples of chaos in engineering systems, electrical systems (Van Der Pol oscillator); Fluid mechanical systems (Lorenz equations, Aeroelastic flutter), Vibration (Duffing equation), Chemical reactions (Belousov-Zhabotinski reaction) etc. Basic concepts in the mathematical treatment of non linear systems. Note: The emphasis in this course will be on developing a physical understanding of chaotic systems. There will be computer simulation demonstration.

Text/Reference Books
Objective: This course is designed to learn advance technology which use microorganisms & plants to remediate polluted & contaminated sites eg. Industrial waste water, sewage etc. as well as to make students learn about emerging technologies in this area.

Course Content
General Introduction, toxic chemicals in the environment, Xenobiotic compounds, Properties, toxicity & types of toxicity, classification of toxicants in environment; atmospheric toxicants; Conventional remediation, thermal, chemical & physical processes, role of microorganisms in pollutant degradation, Bioremediation: process, classification: In situ & Ex situ bioremediation; constrains & priorities of bioremediation; evaluation of bioremediation; factors affecting process of bioremediation, methods in determining biodegradability; contaminant availability for biodegradation. Microbial remediation & phytoremediation, Impact of biotechnology on bioremediation & global application of bioremediation technologies & case studies, Emerging Environmental Biotechnologies: Bioleaching, Biosorption Biotransformation, Biomonitoring, Microbial fuel cells.

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Open Elective - IV)

CE-464 Environmental Management

Objective: To develop the understanding of various environmental management techniques, legal procedure in India, development of environmental friendly industries, environmental audits & concept of green buildings.

Course Content


Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Open Elective - IV)

CS-459 Statistical Simulation & Data Analysis  L-T-P-C  3-0-0-3

Objective: The course is designed to discuss the methods to simulate the statistical inferences obtained from the various datasets. The course discusses the various data analysis methods available & their usage in generating inference from the datasets.

Course Content
Introduction to probability distributions. Basics of estimation & testing of hypothesis (frequentist approach, Bayesian approach).
Different censoring schemes: Type-I, Type-II, hybrid, progressive. Different models & EM algorithm: mixture model; bivariate distributions; cure rate model; competing risk model.
Generating random sample: discrete & continuous multivariate distributions (multinomial, multivariate normal, multivariate exponential); acceptance rejection principle; Monte Carlo markov chain (metropolis Hastings algorithm, Gibbs sampler); Convergence of MCMC: Harris irreducibility, recurrence, minorization, limit theory for Harris recurrent markov chains.
Text/Reference Books


Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Open Elective - IV)

EC-473
Robotics & Automation

L-T-P-C 3-0-0-3

OBJECTIVES: To introduce the basic concepts, parts of robots & types of robots & to make the student familiar with the various drive systems for robot & various applications of robots, justification & implementation of robot.

Course Content
Introductory Concepts: Introduction to robotics, robotics history & development, classification of robotics, robotics applications & current research trends in robotics.

Motion planning: General consideration in path description & generation, Joint space planning, Cartesian space planning, position & orientation trajectory, point to point planning, continuous path generation, Introduction to robotic vision, image representation & analysis, template matching edge detection, space analysis, prospective transformation, camera calibration, image compression techniques.

Text/Reference Books
Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Open Elective - IV)

ME-466
Power Generation & Economics
3-0-0-3

Objective: The goal of the course is to provide a fundamental understanding of the principles of hydro-electric, steam power, gas power, nuclear power & non-conventional power along with the economy associated with them as well as the present status, growth & developments of these power plants in India & across the world.

Course Content

Texts / Reference Books
Objective: *This course imparts the knowledge of Biosensors, types of biosensors & their applications in online monitoring of bioprocesses.*

Course Content
Biosensors: components of biosensors, advantages & limitations; types of biosensors; biocatalysis based biosensors, bioaffinity based biosensors & microorganisms based biosensors, biologically active material & analyte. Types of membranes used in biosensor constructions. Design of enzyme electrodes & their applications as biosensors in industry such as health care & environment. Transducers in biosensors: piezoelectric, semiconductor, impedimetric, mechanical & molecular electronics based transducers. Chemiluminiscence - based biosensors principles & applications; calorimetric, optical, potentiometric / amperometric / conductometric / resistormetric transducers; biosensors in clinical chemistry, medicine & health care, biosensors for veterinary, agriculture & food. Low cost- biosensor for online & environmental monitoring, Molecular electronics, assembly of photonic biomolecular memory store, information processing; commercial prospects for biomolecular computing systems.

Text/References Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Open Elective - V)

CS-461 Soft Computing L-T-P-C 3-0-0-3

Objective: This course deals with soft computing concepts, neural networks, fuzzy logic, use of heuristics based on human experience, Genetic algorithm & its applications to soft computing, Optimization problems to Text Analytics.

Course Content

Text/Reference Books
Objective: To get acquainted the students with various factors & control of hydro power plants.

Course Content
Types of Hydro plants subsystems of hydro plant, turbines, hydro alternates hydro plant. Auxiliaries, control of hydro power, micro hydel systems, special problems in hydro plants.

Texts / Reference Books
Detailed Syllabus for B.Tech. Degree Programme
in
Electrical Engineering

Semester-VIII

(Open Elective - V)

MA-453
Mathematical Statistics

L–T–P–C
3–0–0–3

Objective: To introduce the fundamental techniques of Sampling, Estimation & Hypothesis testing & illustrate these techniques with applications.


Text/Reference Books

Detailed Syllabus for B.Tech. Degree Programme in Electrical Engineering

Semester-VIII

(Open Elective - V)

ME-467 Total Quality Management
L-T-P-C 3-0-0-3

Objective: This course discusses total quality is a description of the culture, attitude & organization of a company that aims to provide, & continue to provide its customers with products & services to satisfy the needs.

Course Content
Quality Management: Organization structure & design, Quality function, decentralization, Designing & fitting organization for different types products & company, Economics of quality value & contribution, Quality cost, optimizing quality cost, seduction programme. Human Factor in Quality: Attitude of top management, cooperation, of groups, operators attitude, responsibility, causes of operators error & corrective methods.Control Charts: Theory of control charts, measurement range, construction & analysis of R charts, process capability study, use of control charts. Attributes of Control Charts: Defects, construction & analysis off-chart, improvement by control chart, variable sample size, construction & analysis of C-chart. Defects Diagnosis & Prevention : Defect study, identification & analysis of defects, corrective
measure, factors affecting reliability, MTTF, calculation of reliability, Building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle. ISO-9000 & its concept of Quality Management: ISO 9000 series, Taguchi method, JIT in some details

**Texts / Reference Books**
PH-455 Electromagnetic theory & Application 3 0 0 3 3 0 0 3

Objective: Objective of this course to introduce the concepts of electromagnetic wave propagation in various media & their applications in various communication systems: waveguides, transmission lines, antenna etc.

Course Content
moments: Introductory example from electrostatics, Basic steps of the method of moments, Linear operator equation, Applications.

**Text/Reference Books**