KAKATIYA UNIVERSITY
BACHELOR OF TECHNOLOGY First Year
Structure of Curriculum-Common to All Branches

Semester-I (First Year)

Branch/Course Common to all branches of UG Engineering & Technology

Sl. No.	Category/ Code	Course Title	Internal Marks	External Marks	Total marks	Lecture	Tutorial	Practical	No of Credits
1	Basic Sciences Course /BSC 101	Physics	30	70	175	3	1	-	5.5
		Lab.	25	30		-	-	3	
2	Basic Sciences Course /BSC 103	Mathematics-I	30	70	100	3	1	0	4
3	Engineering Science Courses/ESC101	Basic Electrical Engineering	30	70	175	3	1	-	5
		Lab.	25	50				2	
4	Engineering Science Courses/ESC102	Engineering Graphics & Design	30	70	175	1	0	4	3
		Lab.	25	50					
5	Engineering Science Courses	Engineering Mechanics	30	70	100	3	1	0	4
		Total Credits							21.5

In order to balance the load of the some of the subjects which are made in groups (Physics/Chemistry, Engineering Graphics & Design/ Workshop and Manufacturing Practices, Programming for Problem Solving/Engineering Mechanics), the half of the branches of B.Tech course offer one subject of group in odd semester and other half of the branches of B.Tech course offer another subject of same group in odd semester. In the even semester the subjects of the group will be exchanged

MANDATORY INDUCTION PROGRAM

BEFORE BEGINNING OF FIRST SEMESTER

3 Weeks Duration

- Physical Activity
- Creative Arts
- Universal Human Values
- Literay
- Proficiency Modules
- Lectures by Eminent People
- Visits to Local Areas
- Familiarization to Dept./Branch & Innovations

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

PHYSICS
(Theory)

Course code	BSC101				
Category	Basic Science Course				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Internal marks = 30
	3	**1**	**-**	**4**	External Marks = 70

Detailed contents:

UNIT-I

SCALARS AND VECTORS

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates.***(8 lectures)***

UNIT II

POTENTIAL ENERGY FUNCTION

Potential energy function; F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler's problem; Application: Satellite manocurves.***(7 lectures)***

SIMPLE HARMONIC MOTION

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.***(6 lectures)***

UNIT- III

RIGID BODY

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.***(5 lectures)***

UNIT-IV

ELECTROSTATICS IN VACUUM

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Faraday's cage and coffee-ringeffect.Boundary conditions of electric field and electrostatic potential,method of images,energy of a charge distribution and its expression in terms of electric field ***(8 lectures)***

MAGNETOSTATICS

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities***.(6 lectures)***

UNIT-V

FARADAY'S LAWS

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law.***(3 lectures)***

DISPLACEMENT CURRENT, MAGNETIC FIELD DUE TO TIME DEPENDENT ELECTRIC FIELD AND MAXWELL'S EQUATIONS

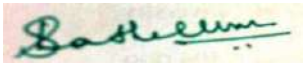
Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time-dependent electric field; calculating magnetic field due to changing electric fields in quasi-static approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. ***(5 lectures)***

Suggested Text Books

(i) Introduction to Mechanics — MK Verma
(ii) Introduction to Electrodynamics---David Griffiths
(iii) Engineering Mechanics, 2nd ed. — MK Harbola

Suggested Reference Books:

(i) Halliday and Resnick, Physics
(ii) W. Saslow, Electricity, magnetism and light
(iii) An Introduction to Mechanics — D Kleppner& R Kolenkow
(iv) Principles of Mechanics — JL Synge & BA Griffiths
(v) Mechanics — JP Den Hartog
(vi) Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
(vii) Mechanical Vibrations — JP Den Hartog
(viii) Theory of Vibrations with Applications — WT Thomson



Dr. C.J. Sreelatha
Chairperson Board of Studies in Physics,KU,Wgl
Date:

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

PHYSICS
(Lab.)

Course code	BSC101				
Category	Basic Science Course				
Course title	**Physics-Practical**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Internal marks = 25
	-	**-**	**3**	**1.5**	External Marks = 50

APPLIED PHYSICS LAB

Choice of experiments from the following:

1. Coupled oscillators.

2. Experiment on moment of inertia measurement.

3. Experiments with gyroscope.

4. Resonance phenomena in mechanical oscillators.

5. LC circuit and CR circuit.

6. Resonance phenomena in LCR circuits.

7. Magnetic'field from Helmholtz coil.

8. Measurement of Lorentz force in a vacuum tube.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

MATHEMATICS -1

MAXIMUM HOURS:48

Unit 1: Sequences and Series

Sequences , series, general properties of series , series of positive terms, comparison test, integral test, ratio test, Cauchy's root test, D' Alembert's ratio test. Fourier series, Euler's formula, condition for Fourier expansion, Even and odd functions.

(Sections 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 10.1, 10.2, 10.3, 10.6 of Text Book)

Unit 2: Calculus

Fundamental theorems (without proofs) Rolle's Theorem (algebraic and geometrical interpretation, geometrical proof), Legrange's mean value theorem, Cauchy's mean value theorem, Taylors theorem, Maclaurin's series. Asymptote's parallel to axis, curve tracing (simple curves only), radius of curvature for cartesian curves.

(Sections 4.3, 4.10, 4.11, 4.16, 4.17, 9.7 of Text Book)

Unit 3: Multivariable Differential Calculus

Functions of two or more variables, partial derivatives, total derivatives, change of variables, Jacobians, Taylor's theorem (without proof), errors and approximations, maxima and minimum of functions of two variable. Scalar and vector point functions, gradient, divergence, curl, physical interpretation.

(Sections 5.1, 5.2, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 8.5, 8.6 of Text Book)

Unit 4: Multivariable Integral Calculus

Double integrals, change of order of integration , triple integrals, change of variables, beta and gamma function, line integrals, surface integrals, volume integrals, Greens, Gauss and Stokes theorems (without proof) irrotational fields, solenoidal fields.

(7.1, 7.2, 7.5, 7.7, 7.14, 7.15, 7.16, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.18 of Text Book)

Unit 5: Differential Equations

Differential equations of first order, formation of differential equations. variable separable form, Bernouli's equation, exact equations, physical applications (Newton's law of cooling, rate of decay) linear differential equations, applications of linear differential equations (simple harmonic motion, oscillating electric circuits). (Sections 11.1, 11.3, 11.4, 11.6, 11.10, 11.11, 12.6, 12,8, 14.1, 14.2, 14.5 of Text Book)

Text Book: B.S. Grewal et.al, Higher Engineering Mathematics, 43rd Edition, Khanna Publicationns.

Reference: Erwin Kreyszig, Aadvanced Engineering Mathematics, 8th Edition, John Wiley & Sons.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

BASIC ELECTRICAL ENGINEERING

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks:30
3	1	0	4	External Marks:70

UNIT – I (7+3)

DC circuits: Introduction, network elements (R, L and C), electric power, electrical energy, Ohm's law, Kirchhoff's laws, resistances in series-voltage divider rule; resistances in parallel-current divider rule, series & parallel circuits, mesh analysis and nodal analysis.

DC network theorems: Introduction, superposition theorem, Thevenin's theorem, Norton's theorem and maximum power transfer theorem. Time-domain analysis of first-order RL and RC circuits.

UNIT – II (7+3)

1-ϕ AC circuits: Phasor representation of sinusoidal quantities, average and R.M.S values of sinusoidal wave form, Form Factor, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), series resonance.

3-ϕ AC circuits: Production of 3-ϕ voltages, voltage & current relationships of line and phase values for balanced star and delta connections.

UNIT – III (7+3)

Transformers : Magnetic materials, BH characteristics, Construction, principle of operation & applications of 1-ϕ transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer and 3-ϕ transformer connections.

Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Significance of torque-slip characteristic, starting and speed control of induction motor and Applications.

Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications.

UNIT – IV (7+3)

DC Generators : Constructional features, operating principle, EMF equation, types of DC Generators, magnetization characteristics of DC shunt generator and Applications.

DC Motors: Principle of Operation, Torque Equations, Operating Characteristics of DC Motor, Speed Control Methods and Applications.

Synchronous Generators : Construction and principle of operation of Synchronous generators.

UNIT –V (6+2)

Power Converters : DC-DC buck and boost converters, duty ratio control. Single-phase voltage source inverters and sinusoidal modulation.

Electrical Installaiton: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. B.L.Thereja, A.K.Thereja, "Electrical Technology Vol. I & II"**,** *S.Chand & Company Ltd*, edn , 2005.
2. Edward Hughes, "Electrical & Electronics Technology", *Pearson Education,* 10/e., 2010.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", *Tata McGraw Hill*, edn , 2010.

Reference Books:

1. K. Uma Rao, "Basic Electrical Engineering", *Pearson Education,* edn, 2011.
2. Chakravarthy A, Sudhipanath and Chandan Kumar, "Basic Electrical Engineering", *Tata McGraw Hill Ltd*, edn, 2009.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

BASIC ELECTRICAL ENGINEERING LAB

Class: I/IV B.Tech., I Semester **Branch: Common to all**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks:25
0	0	2	1	External Marks:50

1. Verification of KVL, KCL
2. Transient response of R-L, R-C, R-L-C circuits with DC excitation
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Verification of Maximum Power Transfer Theorem
6. Determination of internal resistance and internal inductance of choke coil
7. Resonance in RLC series circuit
8. Speed control of DC Shunt motor
9. Open Circuit and Short Circuit Test on single phase Transformer.
10. Performance characteristics of 3 phase squirrel cage induction motor
11. Demonstration of components of LT switchgear

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

ENGINEERING GRAPHICS

Teaching Scheme				Examination Scheme
L	T	P	c	Internal Evaluation -30
1	0	4	3	External Evaluation -70

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their ignificance, Usage of Drawing Instruments, Lettering. Conic Sections including the Rectangular Hyperbola – General method only Cycloid,Epicycloid and Hypocycloid, Scales – Plain, Diagonal and vernier.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV

Isometric Projections: Principles of Isometric Projection – Isometric Scale , Isometric Views ,Conventions , Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

UNIT – V

Development of Surfaces: Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

Introduction to CAD: (For Internal Evaluation Weightage only)

Introduction to Auto CAD Commands, Draw Tools,Modify Tools, Text, Dimension Properties, DIMENSION, PROPERTIES tool bar, Standard Tool bar, LAYERS.

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing / M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: Syllabus must be complete in 48 theory hours, however theory hours may be converted in to equal practical hours as per credits

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

ENGINEERING MECHANICS

Teaching Scheme :					Examination Scheme :	
L	**T**	**P**	**C**		Internal Evaluation :	30 marks
3	1	-	4		End Semester Exam :	70 marks

Course Learning Objectives (LOs):

LO1: develop concept of force, reactions, principles of force and their application on engineering structures and machines
LO2: introduce various kinds of statically determinate pin jointed structures and methods of analysing the trusses
LO3: understand the importance of geometric centre, cross sectional areas of plane lamina and moment of inertia
LO4: understand the behavior of particles in motion subjected to system of forces.

UNIT – I (6+2)

Laws of Mechanics: Parallelogram law of forces, triangle law of forces, Newton's law of gravitation, law of superposition and transmissibility of forces.

Force Systems: Types of forces, co-planar, concurrent and parallel forces, moment and couple, free body diagram, resultant of force systems, resolution of forces, composition of forces, equilibrium equations of forces, Lami's theorem, Varignon's theorem, moment equilibrium equations, types of supports, beams and loadings, statically determinate structures, resultant and equilibrium of general force system.

UNIT –II (8+2)

Friction: Introduction, classification, laws of friction, coefficient of friction, angle of friction, ladder friction and wedge friction.

Plane Trusses: Rigid truss, stability and determinacy conditions, basic assumptions for a perfect truss, analysis of trusses by method of joints and method of sections of a cantilever and simply supported statically determinate pin-jointed trusses.

UNIT– III (8+2)

Centroid: Centroid of one dimensional figures, centroid of simple figures from first principles, centroid of composite sections.

Moment of Inertia: Moment of inertia of plane sections from first principles, theorems of moment of inertia – parallel axis theorem and perpendicular axis theorem, moment of inertia of standard sections and composite sections.

UNIT - IV (8+2)

Kinematics: Introduction to dynamics, rectilinear motion of a particle – displacement, velocity and acceleration, motion with uniform acceleration and motion with variable acceleration, curvilinear motion- rectangular components, components, acceleration of normal and tangential acceleration, projectile motion.

UNIT - V (8+2)

Kinetics: Rectilinear motion-equations of rectilinear motion, equations of dynamic equilibrium, D'Alembert's principle, curvilinear motion-equations of motion in rectangular components, tangential and normal components, equations of dynamic equilibrium, applications of work-energy, impulse –momentum principles of rectilinear motion and curvilinear motion.

Text Books:

- Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 14th edn., 2014.

Reference Books:

- Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, "Engineering Mechanics in SI units", *McGraw Hill Education Pvt. Ltd.,* New Delhi, 5th edn., 2013.

- Bhavikatti S.S., "Engineering Mechanics", *New Age International,* New Delhi, 4th edn., 2013 (reprint).

- Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press*, 9th edn., 2013.

- Vijay HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" Kumar Reddy K., Suresh Kumar J. "Singer's Engineering Mechanics Statics and Dynamics" *BS Publications / BSP Books*, 3rd edn. (SI Units), 8th Reprint, 2014

KAKATIYA UNIVERSITY
BACHELOR OF TECHNOLOGY
FIRST YEAR SYLLABUS
Structure of Curriculum-Common to All Branches

Semester –II (First Year)

Branch/Course: Common to all branches of UG Engineering & Technology

Sl. No.	Category/ Code	Course Title	Internal Marks	External Marks	Total Marks	Lecture	Tutorial	Practical	No of Credits
1	Basic Sciences Course /BSC 102	Chemistry	30	70	175	3	1	-	5.5
		Lab.	25	50		-	-	3	
2	Basic Sciences Course /BSC 104	Mathematics-II	30	70	100	3	1	0	4
3	Engineering Science Courses/ESC103	Programming for Problem Solving	30	70	175	3	0	-	5
		Lab.	25	50				4	
4	Engineering Science Courses/ESC104	Workshop and Manufacturing Practices	30	70	175	1	0	-	3
		Lab.	25	50		-	-	4	
5	Humanities and Social Sciences including Management courses/HSMC101	English	30	70	175	2	0	-	3
		Lab.	25	50				2	
		Total Credits							20.5

In order to balance the load of the some of the subjects which are made in groups (Physics/Chemistry, Engineering Graphics & Design/ Workshop and Manufacturing Practices, Programming for Problem Solving/Engineering Mechanics), the half of the branches of B.Tech course offer one subject of group in odd semester and other half of the branches of B.Tech course offer another subject of same group in odd semester. In the even semester the subjects of the group will be exchanged

MANDATORY INDUCTION PROGRAM

BEFORE BEGINNING OF FIRST SEMESTER

3 Weeks Duration

- Physical Activity
- Creative Arts
- Universal Human Values
- Literay
- Proficiency Modules
- Lectures by Eminent People
- Visits to Local Areas
- Familiarization to Dept./Branch & Innovations

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

CHEMISTRY
(Theory)

***Class*: B.Tech. I Year** | ***Internal Marks*: 30**
***Lectures*: 3 Hrs/Week** | ***External Marks*: 70**

UNIT-I

1. ELECTROCHEMISTRY **(08 Hrs)**

Electrode potential, standard electrode potential, Nernst equation (No derivation); Electro chemical series. Types of electrodes - Hydrogen, Quinhydrone, Calomel, and Ion selective electrode (Glass electrode); Galvanic cell, EMF; Determination of pH using Quinhydrone and Glass electrodes; Potentiometric titrations (Acid-base and Redox). Numerical problems.

Batteries: Primary and secondary batteries - Zinc-Carbon battery & Lead-acid battery.

UNIT-II

1. **CORROSION** **(07Hrs)**

Introduction – causes and effects of corrosion. Dry and wet corrosion. Electrochemical theory of corrosion. Galvanic and differential aeration corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic protection. Surface coatings – metallic coatings – methods of application.

2. **WATER ANALYSIS AND TREATMENT** **(07Hrs)**

Hardness of water - Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness. Determination of hardness of water using EDTA method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Brief review of methods of softening of water - Zeolite process and Ion-exchange process. Desalination of water- Reverse osmosis.

UNIT-III

1 **Organic reactions, synthesis of a drug molecule & Stereochemistry** **(11 Hrs)**

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N^1, S_N^2 reactions. *Electrophilic and Nucleophilic addition reactions*: Addition of HBr to propene. Markownikoff's and anti-Markownikoff's additions; Grignard additions on carbonyl compounds; *Elimination reactions*: Dehydrohalogenation of alkylhalides. Saytzeff rule. *Oxidation reactions*: Oxidation of alcohols using $KMnO_4$ and chromic acid. *Reduction reactions*: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Hydroboration of olefins. *Synthesis and applications of commonly used drug molecules*: Aspirin and Paracetamol.

Stereochemistry: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n- Butane.

UNIT-IV

1. **Molecular structure and Theories of Bonding**: **(08 Hrs)**

   Atomic and Molecular orbitals: Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules. Molecular orbital energy level diagrams (MOED) of N_2, O_2 and F_2 molecules.

   Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT-V

2 **Spectroscopic techniques and applications**: **(07Hrs)**

Interaction of radiation with matter, spectrum of electromagnetic radiation, Principles of spectroscopy, selection rules and applications of Electronic spectroscopy, Vibrational and Rotational spectroscopy of diatomic molecules. Applications. Numerical problems.

TEXT BOOKS:

1. Text Book of Physical Chemistry by *PL Soni and OP Dharmarha*, Sulthan Chand & Sons.
2. Engineering Chemistry by *PC Jain & M Jain*, Dhanapathi Rai publishing Co.
3. Text Book of Engineering Chemistry by *Shashi Chawla*, Dhanapathi Rai publishing Co.

REFERENCE BOOKS:

1. Principles of Physical Chemistry by *Maron and Prutton*.
2. Applied Chemistry- A Text Book of Engineers & Technologists by *HD Gesser*.
3. Chemistry in Engineering & Technology by *Kuriacose and Rajaram.*
4. Text Book of Engineering Chemistry by *CP Murthy, Agarwal and A Naidu.*
5. A Text Book of Engineering Chemistry by *SS Dara.*
6. Engineering Chemistry by *RP Mani, KN Mishra and B Ramadevi.*
7. Engineering Chemistry by *OP Agarwal.*
8. Fundamentals of Molecular Spectroscopy, by C.N. Banwell

Details about Question Paper of External Examination (Model)

Time: **3 Hrs** Marks: **70**

The question paper consists of TWO sections. (section-A & section-B)

SECTION-A (10X01=10 Marks)

Attempt **all** Questions. Each Question carries 01 Mark.

Q I: About **10** short answer type Questions from all the units. (02 Questions from each unit)

SECTION-B (05X12=60 Marks)

Attempt any **five** (**05)** Questions. Each Question carries 12 Marks.

Q II to **Q VIII**: Should be given **one** question from each unit and set to **07** Questions.

KAKATIYA UNIVERSITY
B. Tech. First Year
SEMESTER – II
(Common to all branches)

CHEMISTRY LABORATORY

(Common to all branches)

(Credits: 1.5)

***Class*: B.Tech. I Year** ***Internal Marks*: 25**

***Practical*: 3 Hrs/week** ***External Marks*: 50**

LIST OF EXPERIMENTS:

1. Determination of Hardness (Total, Temparary and Permanent) of water using EDTA method.
2. Determination of chloride content of water by Argentometry.
3. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.
4. Colorimetric analysis-verification of Lambert-Beer's law using $KMnO_4$ solution.
5. Conductometric titration of HCl with NaOH
6. Conductometric titration of CH_3COOH with NaOH
7. Potentiometric titration of HCl with NaOH
8. Potentiometric titration of Fe^{2+} with $KMnO_4$
9. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal.
10. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
11. Determination of surface tension of a given liquid using stalagmometer.
12. Synthesis of Urea-Formaldehyde resin polymer / Synthesis of Aspirin.

TEXT BOOKS:

1. *Vogel's* Inorganic Quantitative analysis (2007).
2. College Practical Chemistry by *VK Ahluwalia* (2007)
3. Senior Practical Physical Chemistry by *BD Khosla, A Gulati and VC Garg* (2001)
4. Practical Physical Chemistry by *B Vishwanathan, PS Raghavan.*
5. Text book on Experiments and calculations in Engineering chemistry – *S.S. Dara*
6. *Vogel*'s text book of practical organic chemistry *5th edition*

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

MATHEMATICS -2

(MAXIMUM HOURS: 48)

Unit 1: Integral Transforms

Laplace Transforms: Laplace transforms of elementary functions, properties, transform of derivatives, transform of integrals, multiplication by t, division by t, evaluation of integrals, inverse transforms, convolution theorem, and application to differential equations.

(21.1, 21.2, 21.3, 21.7, 21.8, 21.9, 21.10, 21.11, 21.12, 21.13, 21.14, 21.15 of Text Book)

Unit 2: Linear Algebra

Rank of a matrix, solution of linear system of equations, consistency of linear system of equations, linear independence vectors and linear dependence vectors, Eigen values and Eigen vectors, Caley Hamilton theorem, reduction to diagonal form, complex matrices, Hermition matrix and conjugate matrix.

(Sections 2.7(1), 2.9, 2.10, 2.12, 2.13, 2.14, 2.15, 2.16, 2.19 of Text Book)

Unit 3: Partial Differential Equations

Formation of partial differential equations, linear equations of first order, non-linear equations of first order, Charpit's method, homogenous equations with constant coefficients , applications (one dimensional wave equation, one dimensional heat flow, two dimensional heat flow).

(Sections 17.1, 17.2, 17.3, 17.5, 17.6, 17.7, 17.8, 18.1, 18.3, 18.4, 18.5, 18.6 of Text Book)

Unit 4: Complex Variable - Differentiation

Limit of complex functions, derivative of a complex function, analytic function, Cauchy-Reimann equations, Harmonic functions, applications to flow problems, some standard transformations.

(Sections 20.1, 20.2, 20.3, 20.4, 20.5, 20.6, 20.7, 20.8 of Text Book)

Unit 5: Complex Variables - Integration

Complex integration, Cauchy's theorem, Cauchy's integral formula, Caucly's inequality, Liouvile's theorem, Taylors series, Laurent's series, Singularities of function, residues, residue theorem, evaluation of real definite integrals (integration of trigonometric functions around unit circle, integral of functions around a semi-circle).

(Sections 20.12, 20.13, 20.14, 20.15(2,3), 20.16, 20.17, 20.18, 20.20(a, b) of Text Book)

Text Book: B.S. Grewal et.al. Higher Engineering Mathematics, 43rd Edition, Khanna Publicationns.

Reference: Erwin Kreyszig, Aadvanced Engineering Mathematics, 8th Edition , John Wiley & Sons.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

Programming for Problem Solving

Teaching Scheme				Examination Scheme
L	**T**	**P**	**C**	**Internal marks: 30**
3	**-**	**4**	**5**	**External marks:70**

UNIT-I: (6+2)

Introduction:
Block Diagram of Computer, Number system (Binary, Octal and Hexa decimal), Input-Output devices.
Operating system definition goals and services, compliers and interpreter, Problem solving steps, Algorithms, Flow chart, Types of programming languages, Introduction to C –language.

Unit-II: (7+3)

Fundamentals of C-language:
Token of C-languages: Identifiers, key words, Constants, Data types, Declaration and initialization statements, compound statements, Operators, Expressions and evaluation, Type conversion, Input-output statements, Structure of C-program.

Unit-III: (7+3)

Control structures/statements:
Decision statements: if, if-else, if-else-if, nested-if and switch-case
Iterative statements: while, do-while and for
Unconditional branching statements: break, continue, goto and exit .

Unit-IV: (7+3)

Arrays and Pointers:
Arrays: Definition of Arrays, 1-Dimensional arrays, 2-Dimensional arrays and multi dimensional arrays, Strings, String handling functions.
Pointers: Definition and declaration of pointer, operation on pointers, pointer and arrays, pointer to functions

Unit-V: (7+3)

Structure-Union: Definition and syntax of structure, union, Comparison between union & structure, nested structures, array of structures, pointer to structures.
Functions: Definition, function prototype, library and user define functions, types of functions, storage classes, parameter passing methods (call by value and call by address), recursion and macros.
Files: Introduction, File modes, Input and out operations on files.

TEXT BOOKS:

1. Let Us C, 14th Edition, Yashavant P. Kanetkar, BPB Publications, ISBN 13: 9788183331630.
   Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.

2. C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, ISBN 0-13-110362-8

TEXT/REFERENCE BOOKS:

1. Programming in ANSI C, SIXTH edition, E.Balaguru Swamy, Tata McGraw Hill Pvt Ltd, ISBN-10: 1259004619.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
3. Programming in C. Second Edition, Reema Thareja, ISBN: 9780199456147, Oxford University Press.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

PROGRAMMING FOR PROBLEM SOLVING LAB USING C

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
-	-	4	2	External Marks: 50

LIST OF EXPERIMENTS

1. Programs using input output functions
2. Programs for declaration statement, initialization statement, data type conversions
3. Programs using all operators in C
4. Programs using conditional control structures; if, if-else, nested if, if else if ladder and switch
5. Programs using loop control structures: while, do-while, for,
6. Programs using unconditional statements : break, continue, goto
7. Programs on one dimensional array and two dimensional arrays
8. Programs using functions: different types, parameter passing using call-by-value, call-by-reference
9. Programs using recursion
10. Programs using strings and sharing handling functions
11. Programs using pointers, pointers to arrays, pointer to functions
12. Programs using structures and unions

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

ENGINEERING WORKSHOP

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry –

1. Study of Carpentry Tools, Equipment and different joints.
2. Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

II. Fitting –

1. Preparation of square-Fit as per the given specifications.
2. Preparation of Dovetail Fit as per the given specifications.
3. Preparation of Semi-circular as per the given specifications.

III. Foundry –

1. Introduction to foundry, Patterns, pattern allowances, ingredients of moulding sand and melting furnaces. Foundry tools and their purposes
2. Demo of mould preparation
3. Practice – Preparation of mould by using split pattern.

IV. Welding Practice –

1. Introduction, Study of Tools and welding Equipment (Gas and Arc welding)
2. Selection of welding electrode and current, Bead practice.
3. Practice of Butt Joint, Lap Joint. VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)

V. Plumbing:

1. Practice of Internal threading, external threading, pipe bending, pipe fitting.
2. Pipes with coupling for same diameter and with reducer for different diameters.
3. Practice of T-fitting, Y-fitting, Gate valves fitting.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

English

Course Code	HSMC 101				
Category	Humanities and Social Sciences Including Management Courses				
Course Title	**English**				
Scheme and Credits	L	T	P	Credits	Semester-II
	2	0	2	3	
Exam Pattern	Internal 30 Marks and External: 70 Marks				
Course Completion	Max 48 Hours				

Unit 1. Vocabulary Building

1.1 The concept of Word Formation
1.2 Root words from foreign languages and their use in English
1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
1.4 Synonyms, antonyms, and standard abbreviations.

Unit 2. Basic Writing Skills

2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

Unit 3. Identifying Common Errors in Writing

3.1 Subject-verb agreement
3.2 Noun-pronoun agreement
3.3 Misplaced modifiers
3.4 Articles
3.5 Prepositions
3.6 Redundancies
3.7 Clichés

Unit 4. Nature and Style of sensible Writing

4.1 Describing
4.2 Defining
4.3 Classifying
4.4 Providing examples or evidence
4.5 Writing introduction and conclusion

Unit 5. Writing Practices

5.1 Comprehension
5.2 Précis Writing
5.3 Essay Writing

PRACTICALS/LAB: Oral Communication
(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

Prescribed Text Book
Language and Life: A Skills Approach, Orient Blackswan 2018

Suggested Readings:
(i) Practical English Usage. Michael Swan. OUP. 1995.
(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER

Sl. No.	Category	Course code	Course title	Period/Week			Credits
				L	T	P	C
1	BSC	BSC105	Mathematics III	3	0	0	3
2	PCC	EE211	Electrical Circuits - I	3	1	0	4
3	PCC	EE212	Electrical Machines-I	3	1	0	4
4	PCC	EE213	Power Systems - I	3	1	0	4
5	PCC	EE214	Electromagnetic fields	3	1	0	4
6	PCC	EE215	Analog Electronics	3	0	0	3
7	PCC	EE216L	Analog Electronics Laboratory	0	0	2	1
8	PCC	EE217L	Computer Aided Electrical Drawing Laboratory	0	0	2	1
9	MC	MC210	Environmental Sciences	2	0	0	0
			TOTAL CREDITS	**20**	**5**	**4**	**24**

[L= Lectures, T= Tutorials, P= Practical, C= Credits]

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER
BSC-105
Mathematics - III
STATISTICS, PROBABILITY, AND NUMERICAL TECHNIQUES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Module1: Statistical Methods

Introduction, Collection of Data, Graphical Representation, Measures of Dispersion, Moments, Skewness, Kurtosis, Correlation, Coefficient of Correlation, Lines of Regression.

(Sections 25.1, 25.2, 25.3, 25.6, 25.9, 25.10, 25.11, 25.12, 25.13, 25.14 of Text Book)

Module2: Probability & Distributions

Probability, Addition Law of Probability, Independent Events, Baye's Theorem , Random Variable, Continuous Probability Distribution, Expectation, Moment Generating Function, Binomial Distribution , Poisson Distribution, Normal Distribution, Exponential Distribution. (Sections26.1,26.4,26.5,26.6,26.7,26.9,26.10,26.11,26.14,26.15,26.16,26.19(6) of Text Book)

Module3: Numerical Techniques-I

Solution of Algebraic and Transcendental Equations, Principle of Least Squares, Method of Least Squares, Fitting of Other Curves, Finite Differences, Forward Differences, Backward Differences. (Sections 28.2, 24.4, 24.5, 24.6, 30.2, 30.2(1), 30.2(2) Of Text Book)

Module4: Numerical Techniques-II

Central Differences, Other Difference Operators, Newton's Interpolation Formulae, Gauss's Forward Interpolation Formula, Interpolation with Unequal Intervals, Numerical Differentiation. Sections 29.7, 29.4, 29.6, 29.7(1), 29.9, 30.1.of Text Book)

Module5: Numerical Techniques-III

Numerical Integration, Trapezoidal Rule, Simpson's one –third Rule, Simpson's three-eight Rule, Weddle's Rule, Solution of Simultaneous Linear Equations (Iterative Methods)

(Sections 30.4, 30.6, 30.7, 30.8, 30.10, 28.5 of Text Book)

Text Book:
B.S Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publications.

References
1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons
2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand &Sons
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER
MC-210
ENVIRONMENTAL SCIENCES

Teaching Scheme				Examination Scheme	
L	**T**	**P**	**C**	CIE	ESE
0	0	2	0	30 Marks	70 Marks

UNIT–I (8)

Introduction to Environmental Science: Environment and society, major environmental issues: Ozone layer depletion, Acid rains, global climate change etc, sustainable development, Environmental impact assessment, environmental management

Natural Resources Utilization and its Impacts: Energy, minerals, water and land resources, Resource consumption, population dynamics, urbanization..

UNIT–II (8)

Ecology and Biodiversity: Energy flow in ecosystem, food chain, nutrient cycles, eutrofication value of biodiversity, biodiversity at global, national and local levels, threats for biodiversity, conservation of biodiversity.

UNIT–III (8)

Water Pollution: Sources, types of pollutants and their effects, water quality issues, contaminant transport, self-purification capacity of streams and water bodies, water quality standards, principles of water and wastewater treatment.

UNIT–IV (8)

Air Pollution: Sources, classification and their effects, Air quality standards, dispersion of pollutants, control of air pollution, automobile pollution and its control.

UNIT–V (8)

Solid Waste Management: Sources and characteristics of solid waste, effects, Collection and transfer system, disposal methods.

Text Books:

1. M. Chandrasekhar, Environmental science, Hi Tech Publishers, 2009.
2. P.N. Modi (2006), Water supply Engineering – Environmental Engineering (Vol. I) – Standard Book House.
3. Gerard Kiely, Environmental Engineering, McGraw Hill Education Pvt Ltd, Special Indian Edition, 2007.

References:

1. W P Cunningham, M A Cunningham, Principles of Environmental Science, Inquiry and Applications, Tata McGraw Hill, Eighth Edition, 2016.

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B. Tech. (EEE) III SEMESTER
EE-211
ELECTRICAL CIRCUITS - I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT – I

Network Elements & Laws: Active elements, Independent and dependent sources. Passive elements — R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and super mesh analysis.

UNIT – II

Single-Phase Circuits: RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series- parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Band-width and Q-factor.

UNIT – III

Network theorems: Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem.(AC & DC).

UNIT – IV

Poly-phase Circuits: Analysis of balanced and unbalanced 3 - phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

UNIT – V

Transient analysis: Transient response of RLC circuits, Formulation of integral differential equations, Initial conditions, Response of RL, RC and RLC networks subjected to internal energy, Response to impulse, step, ramp, exponential and sinusoidal excitations.

Suggested Reading:

1. VanValkenburgM.E.,*NetworkAnalysis*,PrenticeHallofIndia,3rdEdition,2000.
2. WilliamHaytH,KimmerlyJackE,StevenDurbinM,*EngineeringCircuitAnalysis*,McGrawHill, 6th Edition, 2002.
3. Jagan N.C, LakshrninarayanaC.,*NetworkAnalysis*,B.S.Publications,3rd Edition,2014.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER
EE-212
ELECTRICAL MACHINES – I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT-I

Electromechanical energy conversion: Principle of energy conversion, Flow of energy in electro mechanical devices, Coupling-field reaction, Singly excited magnetic system – Electric energy input, Magnetic field energy stored, Mechanical work done – with slow, instantaneous and transient movement of armature, Calculation of mechanical force, Doubly excited magnetic systems, electromagnetic and reluctance torques.

UNIT-II

DC Machines: Simple loop generator, Essential parts of DC machine, Details of Lap winding &

Wave winding, EMF equation, Armature reaction — Remedies, Ampere turns, Commutation — reactance voltage, Methods of improving commutation — High resistance brushes, shifting of brushes, Interpoles, Compensating winding.

UNIT- III

DC Generators; Classification & types of DC generators, Open circuit, Internal & External characteristics — Critical resistance & critical speed, Voltage regulation, Conditions for self excitation, Causes of failure of voltage buildup, Parallel operation Series, Shunt and Compound generators, Applications.

UNIT- IV

DC Motors: Classification & Types of DC motors, Back emf, Speed regulation, Armature torque, Armature reaction, Operating characteristics, Performance curves, Basic speed control methods Shunt and Series motors, Three & four-point starters, Calculation of step resistances, Applications.

UNIT - V

Testing, Losses and Efficiency: Power losses — Copper losses and Rotational losses, Power flow, Efficiency, Testing - Brake Test and Swinburne's test, Hopkinson's test, Field's test, Retardation test, Heat run test.

Suggested Reading

1.D.P.Kothari,I.J.Nagrath,*ElectricMachines*,TataMcGrawHill,4th Edition, 2010

2.Bhimbra P.S.,*ElectricalMachinery*,KhannaPublications,2000

3.GuptaJ.B.,*TheoryandPerformanceofElectricalMachines*,S.K.Kataria&Sons,Delhi,2005.

4.AEClaytonandNNHancock, *ThePerformanceandDesignofDirectCurrentMachines*,3rd edition,1959.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER
EE-213
POWER SYSTEMS – I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT- I

Economics of Power Generation: Load Curve, Load Demand and Diversified factors, Base

Load and Peak load operation, Types of costs and depreciation fund calculations, Methods of power factor improvement, Economics of power factor improvement, Tariffs, Distribution: 2 wire and 3 wire distributors, Ring mains, AC distribution calculations.

UNIT- II

Steam Power Stations: Choice of site, Layout & various parts of station, Boilers, Turbines,

Super Heaters, Economizers, Air pre-heaters etc. and their Pulverized fuel, Coal handling. **Hydro-Electric Power plants:** Estimation Hydrograph, Flow duration curve, Mass curve, Storage and pondage, Types electric plants and layouts, Prime movers for hydro -electric plants.

UNIT- III

Nuclear Power Plants: Fissile materials, Working principle of nuclear plants and reactor control, Shielding, Types of reactors.

Non-Conventional Energy Sources – Basic principles of Wind, solar and gas turbines..

UNIT - IV

Over-Head Lines: Supports sag and tension calculations, Effect of wind and ice, Erection conditions, Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. Insulated Cables: Conductors for cables, Insulating materials, Mechanical protection, Low voltage cables, Grading of cables, Three phase high voltage cables and Super voltage cables, Capacitance of three-core cables.

UNIT - V

Inductance and Capacitance of Transmission Lines: Inductance and capacitance of overhead line conductors, Single phase and three phase with symmetrical composite conductors, GMR and GMD Spacing, Transposition, Bundled conductors, Effect of earth capacitance.

TEXT BOOKS

1. WadhwaC.L., *Electrical Power Systems*, New Age International (P)Ltd.,4th Edition,2007.
2. WadhwaC.L., *Generation, Distribution and Utilization of Electrical Energy*, New Age International (P) Ltd., 4thEdition, 2006

Suggested Reading.

1. SinghS.N., *Electrical Power Generation*, Transmission and Distribution, Prentice Hall of India, Pvt. Ltd. New Delhi, 2003.
2. V.K.Mehta, *Principles of Power Systems*, S.Chand and Co., 2007.

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B. Tech. (EEE) III SEMESTER
EE-214
ELECTRO MAGNETIC FIELDS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT - I

Review of Vector Analysis: Coulomb's Law, Electric field intensity, Electric field due to different charge distributions. Electric field due to line charge, Sheet charge, Volume charge distribution, Electric flux density, Gauss's law, Divergence theorem,. Potential, Potential gradient, potential field of different charge distributions, Applications of above laws.

UNIT - II

Energy in electrostatic field, Poisson's and Laplace equations, Uniqueness theorem, Solution of Laplace's equation, Conductors, Dielectric capacitance, Conductor properties and Boundary conditions, Calculation of capacitance, Boundary conditions for conductors and perfect dielectric materials.

UNIT - III

Steady magnetic field, Biot-Savart's law, Ampere's law, Stoke's theorem, Magnetic scalar vector potential Faraday's law, Magnetic boundary conditions, Self and Mutual inductances, Force on moving charge, Force on differential elements, Magnetic circuits, Analogy with electrical circuits, Applications of above laws.

UNIT- IV

Maxwell's equations in Integral form, Line and surface integrals, Application to static fields, Boundary conditions, Maxwell's equations in differential forms, Continuity equation, Potential function for static fields, Field equations in vector forms, energy storage in electric and magnetic fields.

UNIT - V

EM waves in homogeneous medium solutions for free space conditions, Uniform plane wave propagation, Poisson's and Laplace's equations, Sinusoidally time varying uniform plane waves in free space, Uniform plane waves in dielectrics and conductors, Poynting vector, Power dissipation, Reflection of uniform plane waves, Introduction to method of moments, Method of images.

Suggested Reading

1. MatthewSadikuN.O., *ElementsofElectromagnetics*,OxfordUniversityPress,4th Edition,2006.

2. William. HaytH, Buck JohnA., *EngineeringElectromagnetics,TataMcGrawHill,7thEdition*, 2003.

3. Nannapaneni Narayana Rao, *Elements of Engineering Electromagnetics*, PHI, New Delhi, 5th Edition, 2002.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
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B. Tech. (EEE) III SEMESTER
EE-215
ANALOG ELECTRONICS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT I

Diode circuits (4 Hours)
P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

UNIT-II

BJT circuits (8 Hours)
Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits.

UNIT-III

MOSFET circuits (8 Hours)
MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier :small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

UNIT-IV

Differential, multi-stage and operational amplifiers (8 Hours)
Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output off set voltage, input bias current, input offset current, slew rate, gain bandwidth product).

UNIT-V

Applications of op-amp (8 Hours)
Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion: (Flash, Successive Approximation, Dual slope).

TEXT BOOKS

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.

Suggested Reading:

3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. D.Roy Chowdary and Shail B Jain, "*Linear Integrated Circuits*", 3rd Edition, New AgeInternational (P) Limited, New Delhi, 2008.

Faculty of Engineering & Technology
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Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER
EE-216L
ANALOG ELECTRONIC LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

List of Experiments:

1. Characteristics of Semiconductor Diodes (Si, Ge and Zener).
2. Characteristics of BJT (CB, CE).
3. CRO and its Applications.
4. Rectifiers: Half Wave Rectifier, Full Wave Rectifier with and without filters
5. Characteristics of FET.
6. Transistors as an Amplifier.
7. Inverting, Non-Inverting Amplifier using Op amp.
8. RC phase shift Oscillator
9. Wien Bridge Oscillator
10. Integration and Differentiation using Op-amp.

Suggested Readings:

1. David Bell A., *Operational Amplifiers and Linear ICS*, Prentice Hall of India, 2005.
2. Maheshwari and Anand, *Laboratory Experiments and PSPICE Simulations in Analog Electronics*, 1st edition, Prentice Hall of India, 2006.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) III SEMESTER
EE-217L
COMPUTER AIDED ELECTRICAL DRAWING LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

Drawing of the following using Electrical CADD / Corel Draw / MS Word / PPT/Visio

1. Lines, Arcs, Curves, Shapes, Filling of objects, Object editing & Transformation.
2. Electrical, Electronic & Electro – mechanical symbols.
3. House – wiring diagrams and layout.
4. Simple power and control circuit diagrams.
5. Electrical machine winding diagrams. (A.C & D.C)
6. Transmission tower, Over head lines – ACSR conductors, Single circuit, double circuit, and Bundle conductor.
7. Constructional features of D.C motors, AC motors and Transformers.
8. D.C and A.C motor starter diagrams.
9. Lamps used in illumination
10. Single line diagram of Power System

Suggested Readings:

1. KB.Raina, S.K.Bhattacharya,*ElectricalDesign,EstimatingandCosting*,WileyEastern Ltd.,1991.

2. Nagrath, Kothari, *Electrical Machines*, TataMcGrawHillPublishingCompanyLtd.,2000.

3. A.K.Sawhney, *ACourse in Electrical Machines Design*, Dhanpat Rai and Sons, 1996.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMESTER

Sl. No.	Category	Course code	Course title	Period/Week			Credits
				L	T	P	C
1	PCC	EE221	Electrical Circuits II	3	1	0	4
2	PCC	EE222	Electrical Machines - II	3	1	0	4
3	PCC	EE223	Power System-II	3	1	0	4
4	PCC	EE224	Power Electronics	3	1	0	4
5	PCC	EE225	Digital Electronics and Logic Design	3	0	0	3
6	PCC	EE226L	Electrical Circuits Laboratory	0	0	2	1
7	PCC	EE227L	Electrical Machines Laboratory-I	0	0	2	1
8	PCC	EE228L	Digital Electronics and Logic Design Laboratory	0	0	2	1
9	MC	MC-220	Constitution of India	2	0	0	0
			TOTAL CREDITS	**17**	**4**	**7**	**22**

[L= Lectures, T= Tutorials, P= Practical, C= Credits]

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMESTER
MC-220
CONSTITUTION OF INDIA

Course code	MC				
Category	Mandatory Course				
Course title	CONSTITUTION OF INDIA				
Scheme and Credits	L	T	P	Credits	Internal marks =30
	2	0	0	0	External Marks = 70

UNIT -1: 1. Making of Indian Constitution - Constituent Assembly
2. Historical Perspective of the Constitution of India
3. Salient Features and characteristics of the Constitution of India

UNIT -2: 1. The Fundamental Rights
2. The Fundamental Duties and their Legal Status
3. The Directive Principles of State Policy – Their Importance and Implementation

UNIT -3: 1. Federal Structure and Distribution of Administrative, Legislative and Financial Powers between the Union and the States
2. Parliamentary Form of Government in India – The Constitutional Powers and Status of the President of India
3. Amendment of the Constitutional Provisions and Procedure

UNIT -4: 1.The Judiciary
2. Constitutional and Legal Frame Work for Protection of Environmental in Global and National Level
3. Corporate Social Responsibility (CSR) International and National Scenario.

Text Books:

1. D.D. Basu: An Introduction of Indian Constitution
2. Greanvile Austin: The Indian Constitution
3. Paras Diwan: Studies on Environmental cases

References Books:

1. Khannna Justice.H.R: Making of India's Constitution, Eastern Book Companies.
2. Rajani Kothari: Indian Politics
3. Ghosh Pratap Kumar: The Constitution of India. How it has been Formed, World Press.
4. A.Agrawal (Ed): Legal Control of Environmental Pollution.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMESTER
EE-221
ELECTRICAL CIRCUITS – II

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT I

Fourier Series and Integral: Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integra l and its properties, Continuous spectrum, Application to simple networks

UNIT II

Laplace Transform Method of Analysis of Networks: Definition of Laplace pair, Evaluation of Laplace transform of common time function, Laplace properties and theorems, Convulution theorem, Waveforms synthesis, Partial fraction method of inverse transforms, Application to networks, Transfer functions.

UNIT III

Two port network parameters: Open circuit impedance, Short circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, Impedance and admittance functions

UNIT IV

Topological Description of Networks: Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix, Formulation of node equations, loop equations, cut-set equations for RLC networks.
Network synthesis of driving point functions, Positive real function, properties of PR functions, Testing of PR functions

UNIT V

Synthesis of LC, RC, RL functions, Properties of LC, RC and RL networks, Minimum Functions, Synthesis of RLC networks, Brune's method, Properties of networks interms of poles and zero.

Suggested Reading:

1. VanValkenburgM.E, *Network Analysis*, Prentice Hall of India, 3rd Edition,2000.
2. WilliamHaytH,KimmerlyJackE.andStevenDurbinM,*EngineeringCircuitAnalysis*,McGraw Hill, 6th Edition,2002
3. JaganN.C,Lakshrninarayana C.,*NetworkAnalysis*,B.S.Publications,3rd Edition,2014.
4. ChakravarthyA.,*CircuitTheory*,DhanpatRai&Co.,FirstEdition,1999

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMESTER
EE-222
ELECTRICAL MACHINES –II

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT-I

Single Phase Transformers: Constructional features of single phase transformers, principle of two winding transformer, ideal transformer - transformer on no load and on load - phasor diagrams• equivalent circuits, losses , Testing - Polarity test, OC and SC tests, Sumpner's test, Regulation and efficiency, All day efficiency, separation of losses - Excitation phenomena in transformers, Auto transformer - Comparison with two winding transformer and applications.

UNIT-II

Three - Phase Transformers: Connections - Choice of transformer connections – Third harmonic voltages - Phase conversion - 3-phase to 2-phase transformation, Scott connection - constructional features of poly phase transformers - Tertiary winding, Parallel operation of transformers, phase shifting transformer, Tap changer.

UNIT-III

Three - Phase Induction Motor: Constructional features - Rotating magnetic field theory, Principle of operation of Squirrel cage and Slip ring motors, Phasor diagram, Equivalent Circuit – expression for torque - starting torque - Max torque. Slip-torque characteristics, Equivalent circuit parameters from no-load and blocked rotor test, Circle diagram, Determination of performance characteristics of induction motor, Applications.

UNIT-IV

Starting & Speed Control Methods: Starting methods of 3-phase induction motor –Auto transformer, Star-delta Starter. Double cage machine, Speed control methods – Resistance control, Voltage Control, Pole changing, Cascading, Induction Generator - Principle of operation, Applications.

UNIT-V

Single Phase Motors: Double field revolving theory. Equivalent circuit of single phase induction Motor- Principle of operation, speed torque characteristics of a split phase and capacitor motors. Compensated and uncompensated series motor, Repulsion motor and universal motor - Applications.

Suggested Reading:

1. P.S.Bimbhra-Electrical Machinery, KhannaPublishers2006
2. D.P.Kothari&I.J.Nagrath, Electrical Machines, Tata McGraw Hill, 4th Edition, 2010.
3. M.G.Say-ThePerformanceandDesignofAC.MachinesPitmanPublication, 2002.
4. IrvingL. Kosow-Electric Machinery and Transformers. PPH, Pearson Education 2nd Edition, 2009.

Faculty of Engineering & Technology
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Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMESTER
EE-223
POWER SYSTEMS – II

Teaching Scheme				Examination Scheme	
L	T	P	C	Internal Marks	External Marks
3	1	0	4	30	70

UNIT-I

Transmission Line Theory: Performance of short, medium, long lines - Line calculations - Tuned lines, Power circle diagram and their applications. Corona - Causes - Disruptive and

Visual critical voltages - Power loss - Minimization of corona effects.

UNIT-II

Symmetrical Faults: Use of per unit quantities in power systems, advantages of per unit system. Symmetrical Three-phase Faults, Transients in RL series circuits - Short circuit currents - Reactance‘s of synchronous machines - Symmetrical fault calculations, Short circuit capacity of bus.

UNIT-III

Unsymmetrical Faults: Symmetrical components of unsymmetrical phasors - Power in terms of symmetrical components - Sequence impedance and sequence networks, Sequence networks of unloaded generators - Sequence impedances of circuit elements - Single line to ground, line to line and double line to ground faults on unloaded generator - Unsymmetrical faults of power systems, Open circuit faults.

UNIT-IV

Voltage Control: Phase modifiers, Induction Regulators -Tap changing Transformers, Series and Shunt Capacitors, Reactive Power requirement calculations, Static VAR compensators - Thyristor Controlled reactor, Thyristor switched capacitor.

UNIT-V

Travelling Wave Theory *:* Causes of over voltages - Travelling wave theory - Wave equation - Open circuited line - The short circuited line - Junction of lines of different natural impedances - Reflection and Refraction Coefficients - Junction of cable and over head lines - Junction of three lines of different natural impedances- Bewley Lattice diagram.

SUGGESTED READINGS:

1.CLWadhwa-ElectricalPowerSystems,NewAgeInternational,4th edition,2006.

2.GraingerandStevenson-PowerSystemAnalysis,TataMcGrawHill,4th edition,2003.

3.NagarathandKothari-ModernPowerSystemAnalysis,TataMcGrawHill,4th edition-2012.

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B. Tech. (EEE) IV SEMESTER
EE-224
POWER ELECTRONICS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT-I

Power Semiconductor Diodes and Transistors : Power Switching Devices - Ideal Switches, Real Switches, Classification of Power Switching devices, Types of power diodes – Their characteristics and applications, Bipolar Junction transistors - Power MOSFETS, IGBT, BJT and GTO operation and switching characteristics - Comparison of BJT, MOSFET and IGBT – Their applications.

UNIT-II

SCRs - Static and Dynamic Characteristics : Two transistor analogy, SCR trigger circuits R, RC and UJT triggering circuits - Triggering circuits for Single phase bridge rectifier and Choppers, The various commutation methods of SCRs - Cooling and mounting techniques of devices, Introduction to heat pipe cooling.

UNIT-III

Controlled Rectifiers : Single phase (continuous & discontinuous) and three phase (continuous) half controlled and fully controlled bridge rectifiers with R, RL, and RLE loads, Effect of source inductance, Dual converters - circulating current mode and circulating current free mode.

UNIT-IV

Choppers and Cycloconverters: Classification of Choppers• A,B,C,D,E - Step-up chopper -

Switched mode regulators - Study of Buck, Boost and Buck-Boost regulators, Principle of operation of single phase bridge type Cycle-converters and their applications.

UNIT-V

Inverters and Voltage controllers : Single phase Inverters, Three phase bridge inverters (180° and 120" modes) - Voltage control of Inverters - Single pulse width modulation - Multiple pulse width modulation- Sinusoidal pulse width modulation, Comparison of VSI and CSI – Single phase and 3-phase AC voltage controller with R, RL loads.

Suggested Reading:

1. Bimbra.P.S.- PowerElectronics, KhannaPublications,2006.
2. RashidM.H.- Power Electronics Circuits, Devicesand Applications- Prentice Hall of India, 2004.
3. Singh.M.D., KhanchandaniK.B.-PowerElectronics-TataMcGrawHill,14th reprint,1999.
4. Mohan, Undeland &Robbins-Power Electronic Converters. Applications and Design–John Wiley & Sons - 3rdEdition, 2007.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMESTER
EE-225
DIGITAL ELECTRONICS AND LOGIC DESIGN

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT I

Boolean algebras and combinational logic, AND, OR and NOT operations. Laws of Boolean algebra, Minimization of Boolean expressions, Truth tables and maps. Sum of products and product of sums, Map method of reduction, Incompletely specified functions, Multiple output minimization.

UNIT II

Tabular minimization, Digital logic families and IC's, Characteristics of Digital IC's, Introduction to RTL, DTL, TTL, CMOS, ECL families, Details of TTL logic family, Totem pole, Open collector outputs, wired AND Operation, Comparison of performance, TTL sub -families, Multiplexer and dc-multiplexer, Encoder and decoder, Code converters, Implementation of combinational logic using standard logic gates and multiplexers.

UNIT III

Binary arithmetic and circuits, Half and Full adder, Subtractor and Magnitude comparator, Number complements, Two's complement arithmetic, Carry look ahead adder, Decimal numbers and their codes, BCD and Excess -3 arithmetic

UNIT IV

Synchronous Sequential Circuits: basic latch circuits, Debouncing switch, SR, JK, D and T flip- flops, Truth table and execution table, Ripple and Synchronous counters, Up/down counters, General BCD counter, Shift registers, ring counters

UNIT V

A/D and D/A Converters: Converter types — Tracking type, Flash type, Successive approximation type: R-2R ladder, Weighed register type, switched current source type, Switched capacitor type

Suggested Reading:

1. Anand Kumar A., Fundamentals *of Digital Circuits*, Prentice Hall of India, 4th Edition, 2003.
2. Morriss Mano M., *Digital Design*, Prentice Hall of India, 3rd Edition, 2002.
3. Zvykohavi, *Switching & Finite Automata Theory*, Tata McGraw Hill, 2nd Edition, 19

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B. Tech. (EEE) IV SEMISTER
EE-226L
ELECTRICAL CIRCUITS LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

List of Experiments:

1. Charging and Discharging Characteristics of RC and RL series circuits.
2. Locus diagrams of RC and RL Circuits.
3. Frequencies Response of a Series RLC Circuits.
4. Frequencies Response of a Parallel RLC Circuits.
5. Parameters of two port network.
6. Series, parallel and cascade connection of two port networks.
7. Verification of Theorems.
   (a) Thevenin's theorem (b)
   Norton's theorem

   (c) Superposition theorem

   (d) Maximum power transfer theorem
8. Two Wattmeter method.
9. Transients in RLC circuits.
10. Network Synthesis.
11. Characteristics of Linear, Non-Linear and Bilinear Elements.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMISTER
EE-227L
ELECTRICAL MACHINES LABORATORY – I

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

LIST OF EXPERIMENTS

1. Magnetization characteristics of a separately excited D.C. generator.
2. Determination of the load characteristics of shunt and compound generators.
3. Determination of the performance and mechanical characteristics of series, shunt and compound motors.
4. Separation of iron and friction losses and estimation of parameters in D.C. machine.
5. Speed control of D.C. Shunt motor using shunt field control and armature control methods.
6. Separation of core losses in a single phase transformer.
7. Open circuit and short circuit and load test on a single phase transformer.
8. Sumpner's test on two identical transformers.
9. Three phase Transformer connections.
10. Three phase to two phase transformation and open delta connection.
11. Retardation test.
12. Hopkinson's test.
13. Swinburne's test.

Note: At least ten experiments should be conducted in the Semester.

Suggested Reading:

1.P.S.Bimbhra-ElectricalMachinery,KhannaPublishers2006

2.D.P.Kothari&I.J.Nagrath,ElectricalMachines,TataMcGrawHill,4th Edition,2010.

3.M.G.Say-ThePerformanceandDesignofAC.MachinesPitmanPublication,2002.

4.IrvingL.Kosow-ElectricMachineryandTransformers.PPH,PearsonEducation, 2nd Edition, 2009

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) IV SEMISTER
EE-228L
DIGITAL ELECTRONICS AND LOGIC DESIGN LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

LIST OF EXPERIMENTS

1. Combinational logic function realization.
2. Realization of 4 bit binary adder / subtracter.
3. Construction of Decimal to Binary encoder, BCD to Binary, Binary to BCD, BCD 10 Excess- 3.
4. Serial/parallel input shift registers.
5. 4-bit binary up-down counter.
6. *555 timer applications.*
7. *Op-Amp applications - Integrator, Adder, summer.*
8. *Active filters - Low pass filter & High pass filter*
9. *Clippers and Clampers using Op-Amps.*
10. *Study of 723 linear voltage regulator and fixed voltage regulator.*
11. *Generation of triangular and square wave using Op-Amp.*
12. *Schmitt triggers circuit.*

Note: At least ten experiments should be conducted in the semester.

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B. Tech. (EEE) V SEMESTER

S. No.	CourseCode	Course Title	Scheme of Instruction			Lecturer hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PC3101EE	Linear Control Systems	3	1	0	4	30	70	4
2	PC3102EE	Electrical Machines-III	3	1	0	4	30	70	4
3	PC3103EE	Linear IC Applications	3	0	0	3	30	70	3
4	PE-I	Professional Elective-I	3	0	0	3	30	70	3
5	PC3107EE	Measurements and Instrumentation	3	1	0	4	30	70	4
6	HSMC3108	Managerial Economics and Accountancy	3	0	0	3	30	70	3
8	PC3109EE	Electrical Machines-II Laboratory	0	0	2	2	25	50	1
10	PC3110EE	Measurements and Instrumentation Laboratory	0	0	2	2	25	50	1
	Total		**18**	**3**	**4**	**25**	**230**	**520**	**23**

(PE-I) Professional Elective – I

1. PE3104EE Utilization of Electrical Energy
2. PE3105EE High Voltage Engineering
3. PE3106EE Electric Machine Design

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) V SEMESTER

PC3101EE
LINEAR CONTROL SYSTEMS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT-I

Introduction to Control Systems*:* Classification of control systems. Feed-Back Characteristics, Effects of feedback - Mathematical modeling of Electrical and Mechanical systems -Transfer function- Transfer function of Potentiometer, synchro, AC servo motor, DC servo motor - Block diagram reduction technique - Signal flow graph, Masson's gain formula

UNIT-II

Time Domain Analysis*:* Standard test signals - Time response of first order systems - Transient response of second order system for unit step input, Time domain specifications - Steady state response - Steady state errors and error constants - Effects of P, PD, Pl and PID controllers.

UNIT-III

Stability Analysis in S-Domain: The concept of stability - Routh's stability Criterion, Absolute stability and relative stability- limitations of Routh's stability.
Root Locus Technique: The root locus concept - construction of root loci- Effects of adding poles and zeros on the root loci.

UNIT-IV

Frequency Response Analysis*:* Introduction to frequency response - Frequency domain specifications - Bode plot - Stability analysis from Bode plots - Determination of transfer function from the Bode Diagram - Polar Plots, Nyquist Plots, Stability Analysis, Gain margin and phase margin.
Control System Design*:* Introduction - Lag, Lead and Lag-Lead Compensator design infrequency Domain.

UNIT-V

State Space Analysis*:* Concepts of state, State variables and state model, Derivation of state models of linear time invariant systems - Controllable, Observable and Diagonal state models - State transition matrix - Solution of state equation - Concepts of Controllability and Observability.

Text Book:

1. I.J.Nagrath & M.Gopal, Control System Engineering, 4th ed., New Delhi: New Age International Pvt. Ltd.,2012

Reference Books*:*

1. B.C.Kuo - Automatic Control Systems, Wiley India edition, 7th Edition, 2002.
2. K.Ogata - Modern Control System, Prentice Hall of India, 4th edition, 2002.
3. N.C.Jagan - Control Systems, B.S Publications, 2nd edition, 2008.
4. S.Palani, Control Systems Engineering, 2nd ed., New Delhi: Tata McGraw Hill Education (India) Pvt.Ltd.
5. A.Anand Kumar, control systems, 2nd ed., New Delhi: Prentice Hall of India, 2014
6. A.Nagoorkani, Control Systems, 2nd ed., New Delhi: RBA Publications'.

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B. Tech. (EEE) V SEMESTER

PC3102EE
Electrical Machines - III

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT - I

Synchronous machines: Constructional features of round rotor and salient pole machines-Armature winding-integral slot and fractional slot winding-Distribution, pitch and winding factors-EMF equation-Harmonics in generated EMF, suppression of harmonics-Armature reaction-leakage reactance-Synchronous Impedance.

UNIT - II

Synchronous Generator*:* Voltage Regulation – Phasor diagram of round rotor synchronous generator-Load characteristics-Regulation by synchronous Impedance method, MMF method, ZPF method and ASA method.
Salient pole synchronous generators-two reaction theory-experimental determination of Xd and Xq (Slip Test)-phasor diagrams

UNIT-III

Parallel operation of Synchronous machines- Synchronization of alternators with infinite bus bars-Synchronizing power and torque-parallel operation and load sharing-effect of change of excitation and mechanical power input.

Short-circuit analysis on alternators-determination of sub-transient, transient and steady state reactance.

UNIT- IV

Synchronous Motors: Theory of operation-phasor diagram-variation of current and power factor with excitation-hunting and its suppression-starting methods-synchronous condenser-circle diagrams-applications.

UNIT-V

Special Machines*:* Brushless D.C. Motors: Construction & Principle of Operation, Torque equation, Torque -angle Characteristics. Switched Reluctance Motor: Constructional features, Principle of operation, Torque production, Torque - angle characteristics, various operating modes of SRM.
Permanent Magnet Synchronous Motor*:* Construction, principle operation of PMSM and their operating characteristics.

Text Books:

1. Bhimbra P.S., Electrical Machinery., 7th Ed. New Delhi: Khanna Publishers-2014

Reference Books:

1. Kothari D.P. & Nagrath I.J. - Electrical Machines - Tata McGraw Hill, 2004.
2. Bhimbra P.S. - Generalized Theory of Electrical Machines, Khanna Publications, 2000.
3. Say MG. - The Performance and Design of AC. Machines - Pitman Publication, 2002.
4. Irving L. Kosow - Electric Machinery and Transforn1ers, PPH, Pearson Education, 2nd Edition. 2009.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (EEE) VI SEMESTER

PC3103EE
LINEAR IC APPLICATIONS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT – l

Operational amplifiers: Characteristics, Open loop voltage gain, Output impedance, Input impedance, Common Mode Rejection Ratio - Offset balancing techniques - Slew rate, Frequency response - Basic applications - Inverter summer, Analog integrator, Differentiator, Current to voltage converter, Voltage to current converter, Voltage follower, a.c. amplifier.

UNIT – II

Circuits using Op-amps: Voltage limiter, Clipper and Clamper, Precision rectifier-full wave and half wave, Peak detector, Comparator, Zero crossing detector, Schmitt trigger, Monostable, astable and bi-stablemultivibrators, Multiplier, Divider, Difference amplifier, Instrumentation amplifier.

UNIT – III

Waveform generation using Op-amps: Sine, Square, Triangular and Quadrature oscillators, 555 timer - Functional diagram, Operation as monostable and astable, Voltage to frequency converter using 555, 565.

UNIT – IV

Voltage regulators using Op-amp: Series voltage regulators - Shunt regulators using Op-amp - Switching regulators using Op-amp, Buck, Boost, Buck-boost regulators, Regulators using IC 723 - Dual voltage regulator - Fixed voltage regulators - Current sensing and current fold back protection.

UNIT – V

RC active filters: Butterworth - First order - Second order for low pass - High pass - Band pass - Band reject - Notch - State variable filter - Switched capacitor filter - Universal filter - Power amplifiers - Power boosters, Monolithic power amplifier features.

Suggested Reading:

1. Gayakwad W.A. Op-Amps and Linear Integrated Circuits, 4th Edition, Prentice Hall of India, 2002.
2. Malvino Albert Paul, Electronic Principles, 6th Edition, Tata McGraw Hill, 1999.
3. Roy Choudhury, Shail Jam - Linear integrated Circuits, New Age International, 2nd Edition, 2003.
4. William D. Stanley, OP Amps with Linear Integrated Circuits, Pearson, 2000.

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KAKATIYA UNIVERSITY, WARANGAL-506 009
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B. Tech. (EEE) V SEMESTER

PE3104EE

UTILIZAITON OF ELECTRICAL ENERGY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT I

Industrial Heating: Advantages and methods of electric heating. Description, operation and performance of resistance ovens - Design of elements. Core type, Coreless type furnaces, High frequency eddy current heating, Dielectric heating. Arc furnace.

Electric welding: Resistance welding, welding transformer and its rating, various types of Electric arc welding and electric resistance welding.

UNIT II

Schematic Utilization and Connection Diagrams for Motor Control: Two supply sources for 3 phase Induction motors. Direct reversing, remote control operation, and jogging operating of Induction motor. Contactor control circuit. Push button control stations. Over load relays, limit switches, float switches. Interlocking methods for reversing control.

UNIT III

Illumination: Introduction, nature and production of light, Sensitivity of the eye, Units of light. The inverse square law and cosine law, Solid angle, Lighting calculations - Determination of M.S.C.P, Rousseau‘s construction, Discharge lamps, Sodium vapour lamps, Mercury vapour lamps - Fluorescent lamp, LED lamp, starting and power factor corrections, stroboscopic effects - Neon signs, Application to factory lighting, Street lighting and Flood lighting.

UNIT IV

Electric Traction: System of Electric Traction - Transmission of drive - Systems of track electrification - Traction mechanics - Speed time curves - Tractive effort - Specific energy consumption - Mechanics of train movement -Coefficient of adhesion.

Traction Motors: Desirable characteristics, d.c series motors, a.c series motors 3-phase induction motors, d.c motor series and parallel control, Energy saving.

UNIT V

Train Lighting: Systems of train lighting - Special requirements of train lighting - Methods of obtaining unidirectional polarity - Methods of obtaining constant output - Single battery system - Double battery parallel block system - Principal equipment of double battery system - Coach wiring - Dynamo.

Batteries: Lead acid batteries, SMF batteries, Construction and maintenance, Charging and rating of batteries.

Suggested Readings:

1. Partab H, *Art and Science of Utilization of Electric Power*, Dhanpat Rai & Sons, 1997.
2. K.B. Raina and S.K. Bhattacharya, *Electrical Design, Estimating and Costing*, Wiley Eastern Ltd., 1991.
3. Partab H, *Modern Electric Traction*, Dhanpat Rai & Sons, 2000.

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B. Tech. (EEE) V SEMESTER

PE3105EE

HIGH VOLTAGE ENGINEERING

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT – I

Breakdown in Gases
Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge

Breakdown in Liquid and Solid Insulating Materials
Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT – II

Generation of High Voltages
Generationofhighvoltages,generationofhighD.C.andA.C.voltages,generationofimpulsevoltages, generation of impulse currents, tripping and control of impulsegenerators.

UNIT- III

Measurements of High Voltages and Currents
Peakvoltage,impulsevoltageandhighdirectcurrentmeasurementmethod,cathoderayoscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial dischargemeasurements.

UNIT – IV

LIGHTNING AND SWITCHING OVER-VOLTAGES
Charge formation in clouds, Stepped leader, Dart leader, Lightning Surges. Switching over voltages, Protection against over-voltages, Surge diverters, Surge modifiers.

UNIT – V

High Voltage Testing of Electrical Apparatus and High Voltage Laboratories Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment,

High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

TEXT BOOKS:

1. M. S. Naidu and V. Kamaraju, “High Voltage Engineering”, McGraw Hill Education,2013.
2. C. L. Wadhwa, “High Voltage Engineering”, New Age International Publishers,2007.

REFERENCES:

1. D. V. Razevig (Translated by Dr. M. P. Chourasia), “High Voltage Engineering Fundamentals”, Khanna Publishers,1993.
2. E. Kuffel, W. S. Zaengl and J. Kuffel, “High Voltage Engineering Fundamentals”, Newnes Publication,2000.
3. R. Arora and W. Mosch “High Voltage and Electrical Insulation Engineering”, John Wiley & Sons,2011.
4. Various IS standards for HV Laboratory Techniques andTesting

Faculty of Engineering & Technology
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B. Tech. (EEE) V SEMESTER

PE3106EE

ELECTRIC MACHINE DESIGN

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT-I

INTRODUCTION

Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

UNIT-II

TRANSFORMERS

Sizing of a transformer, main dimensions, kVA output for single- and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

UNIT-III

INDUCTION MOTORS

Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of poly-phase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.

UNIT-IV

SYNCHRONOUS MACHINES

Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotordesign.

UNIT-V

COMPUTER AIDED DESIGN (CAD)

Limitations (assumptions) of traditional designs need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to **c**omplex structures of modern machines- PMSMs, BLDCs, SRM and claw-pole machines.

TEXT BOOKS:

1. A. K. Sawhney, “A Course in Electrical Machine Design”, Dhanpat Rai and Sons,1970.
2. M.G. Say, “Theory & Performance & Design of A.C. Machines” , ELBSLondon.

REFERENCES:

1. S. K. Sen, “Principles of Electrical Machine Design with computer programmes”, Oxford and IBH Publishing,2006.
2. K. L. Narang, “A Text Book of Electrical Engineering Drawings”, SatyaPrakashan,1969.
3. A. Shanmugasundaram, G. Gangadharan and R. Palani, “Electrical Machine Design Data Book”, New Age International,1979.
4. M. V. Murthy, “Computer Aided Design of Electrical Machines”, B.S. Publications, 2008.
5. Electrical machines and equipment design exercise examples using Ansoft’s Maxwell 2D machine designpackage.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) V SEMESTER

PC3107EE

MEASUREMENTS AND INSTRUMENTATION

Teaching Scheme				Examination Scheme
L	**T**	**P**	**C**	Internal Marks :30
3	1	0	4	ExternalMarks:70

UNIT- I

Introduction and Error Analysis: Significance of measurement, static characteristics of measuring system-linearity, sensitivity, precision, accuracy, errors in measuring instruments.
Voltage and Current Measuring Instruments: Construction, operation, torque equation, sensitivity, errors, advantages and disadvantages of Permanent Magnet Moving Coil (PMMC) instrument, Moving Iron (MI) instruments and electrodynamometer type instruments, extension of ranges of voltmeters and ammeter, loading effect on measuring instruments.

UNIT- II

Measuring of Power, Energy and Power factor: Construction, operation, torque equation, errors, advantages and disadvantages of dynamometer type wattmeter, induction type energy meter, measurement of three phase active and reactive power, phantom loading, introduction to static energy meter and smart energy meter.

UNIT- III

DC Bridges: Measurement of unknown resistance using Wheatstone bridge, Kelvin's double bridge, Mega ohm bridge and megger.
AC Bridges: Measurement of unknown inductance using Maxwell's bridge, Anderson's bridge, Hay's bridge, Wien's bridge and Owen's bridge, measurement of unknown capacitance using De Sauty's bridge, Schering bridge.

UNIT- IV

Instrument Transformers: Introduction, uses, ratios and burden, current transformers-construction and errors, effect of secondary open circuit, potential transformers- construction and errors, testing of current transformers with Silsbee's method, Introduction to Hall effect current sensor.
Potentiometers: Construction, standardization and applications of DC potentiometers, construction and operation of phase shifting transformer and phase shifting circuit, construction, standardization and operation of polar and coordinate type AC potentiometers, applications of AC potentiometers

UNIT-V

Electronics Instruments: Construction and operation of Cathode Ray Oscilloscope (CRO), electrostatic deflection system, horizontal and vertical amplifiers, screens and probes used in CRO, deflection sensitivity and deflection factor, measurement of unknown frequency and phase using Lissajous patterns, construction and operation of Digital Voltmeters (DVM), block diagram representation of Digital Storage Oscilloscope(DSO).

T**ransducers:** Introduction and classification of transducers, theory of Strain gauges, thermocouples, Linear Variable Differential Transformer (LVDT).

TEXT BOOKS:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005
2. G. K. Banerjee, "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
3. S. C. Bhargava, "Electrical Measuring Instruments and Measurements", BS Publications,2012.

REFERENCES:

1. R. K. Rajput, "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd.,2007.
2. Buckingham and Price, "Electrical Measurements", Prentice – Hall,1988.
3. Reissland, M. U, "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition2010.
4. E.W. Golding and F. C. Widdis, "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing,2011.
5. U.A. Bakshi, A.V. Bakshi, "Electrical Measurements and Instrumentation, Pune: Technical Publications, 2009.

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Department of Electrical & Electronics Engineering

B. Tech. (EEE) V SEMESTER

HSMC3108

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT-I

Meaning and Nature of Managerial Economics: Managerial Economics and its usefulness to Engineers, Fundamental Concepts of Managerial Economics-Scarcity, Marginalism, Equimarginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

UNIT-II

Consumer Behavior: Law of Demand, Determinants, Types of Demand; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply and Concept of Equilibrium.

UNIT - III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price - Output determination under Perfect Competition and Monopoly.

UNIT-IV

Capital Management: Significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

UNIT-V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

Suggested Reading:

1. Mehta P.L., Managerial Economics - Analysis, Problems and Cases,Sulthan Chand & Sons Educational Publishers, 2011
2. Maheswari S.N., Introduction to Accountancy, Vikas Publishing House, 2005
3. Pandey I.M., Financial Management, Vikas Publishing House, 2009

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B. Tech. (EEE) V SEMESTER
PC3109EE
ELECTRICAL MACHINES-II LAB

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

LIST OF EXPERIMENTS:

1. No-load testand blocked rotor test on 3-phase induction motor.
2. Speed control of 3-phase induction motor by (a) Cascade connection (b) Pole changing.
3. Speed control of 3-phase induction motor by (a) Rotor resistance control (b) Slip power recovery scheme.
4. Brake test on 3 phase induction motor to find the performance.
5. Power factor improvement of three phase Induction motor using capacitors.
6. Performance characteristics of single-phase induction motor.
7. Voltage regulation of an alternator by (a) Synchronous impedance method (b) Ampere - turn method (c) Z.P.F. method.
8. Voltage regulation of an alternator by Z.P.F. method.
9. Determination of load characteristics of an alternator
10. Determination of X_d and X_q of salient pole synchronous machine by conducting slip test.
11. Determination of V curves and inverted V curves of synchronous motor.
12. Power angle characteristics of a synchronous machine.
13. Speed control of BLDC motor.
14. Speed control of SRM motor.
15. Dynamic braking of 3-phase induction motor

Note: Atleast ten experiments should be conducted in the Semester.

Suggested Reading*:*

1. Kothari D.P. & Nagrath I.J. - Electrical Machines - Tata McGraw Hill, 2004.
2. Bhimbra P.S. - Generalized Theory of Electrical Machines, Khanna Publications, 2000.
3. Peddapelli Satish Kumar & Sridhar Gaddam – Electrical Machines-a practical approach, De-gruyter publications, Germany.
4. Say MG. - The Performance and Design of AC. Machines - Pitman Publication, 2002.
5. Irving L. Kosow - Electric Machinery and Transforn1ers, PPH, Pearson Education, 2nd Edition. 2009.

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B. Tech. (EEE) V SEMESTER PC3110EE
MEASUREMENTS AND INSTRUMENTATION LAB

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

The following experiments are required to be conducted as Compulsory experiments

1. Calibration and Testing of single-phase energyMeter.
2. Calibration of dynamometer power factor meter.
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMCvoltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination ofTolerance.
5. Dielectric oil testing using H.T. testingKit.
6. Schering Bridge & AndersonBridge.
7. Measurement of 3 - Phase reactive power with single-phasewattmeter.
8. Measurement of displacement with the help ofLVDT.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

9. Measurement of frequency and Phase angle using Lissajous figures.
10. Measurement of frequency using CRO.
11. Measurement of 3 - Phase power with threewattmeter method.
12. Measurement of strain using strain gauge
13. Transformer turns ratio measurement using ACbridges.
14. Measurement of % ratio error and phase angle of given CT bycomparison.

TEXT BOOKS:

1. "G. K. Banerjee", "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. "S.C.Bhargava","ElectricalMeasuringInstrumentsandMeasurements",BSPublications,2012.

REFERENCES:

1. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications,2005.
2. "R.K.Rajput","Electrical&ElectronicMeasurement&Instrumentation",S.ChandandCompany Ltd.,2007.
3. "Buckingham and Price", "Electrical Measurements", Prentice – Hall, 1988.
4. "Reissland,M.U","ElectricalMeasurements:Fundamentals,Concepts,Applications",NewAge International (P) Limited Publishers, 1st Edition2010.
5. "E.W. Golding and F. C. Widdis", "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing,2011.

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B. Tech. (EEE) VI SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PC3201EE	Power Semiconductor Drives	3	1	0	4	30	70	4
2	PC3202EE	Switchgear and Protection	3	0	0	3	30	70	3
3	PC3203EE	Power System Operation and Control	3	1	0	4	30	70	4
4	PE-II	Professional Elective-II	3	0	0	3	30	70	3
5	PC3208EE	Signals and Linear Systems	3	0	0	3	30	70	3
6	PC3209EE	Microprocessor Systems	3	0	0	3	30	70	3
7	PC3210EE	Microprocessor Systems Laboratory	0	0	2	2	25	50	1
8	PC3211EE	Linear Control SystemsLaboratory	0	0	2	2	25	50	1
	Summer Internship(Six weeks during summer vacation)		--	--	--	--	--	--	--
	Total		**18**	**2**	**4**	**24**	**230**	**520**	**22**

(PE-II) Professional Elective – II

1. PE3204EE Electrical Distribution System
2. PE3205EE Electrical Energy Conservation and Auditing
3. PE3206EE Hybrid electric vehicles
4. PE3207EE MOOCS Course*

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B. Tech. (EEE) VI SEMESTER

PC3201EE

POWER SEMICONDUCTOR DRIVES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT – I

Introduction

Block diagram of Electrical drive-Dynamics of Electrical Drives-Four quadrant operation-Steady state stability-Load equalization

Control of DC Motors:

SinglePhasesemiandfullycontrolledconvertersconnected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms –Speed-Torque Characteristics- Problems, three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed-Torque characteristics – Problems.

UNIT - II

Electric Braking – Plugging, Dynamic, andRegenerativeBrakingoperations-FourquadrantoperationofD.Cmotorsbysinglephaseandthree phase dual converters – Closed loop operation of DC motor (Block DiagramOnly)

Control of DC Motors By Choppers: Single quadrant, Two quadrant and four quadrant chopper fed dc separately excited and series motors – Continuous current operation – Output voltage and current wave forms – speed-torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation (Block Diagram Only)

UNIT - III

Control of InductionMotor

Braking of induction motor: analysis of AC dynamic braking and DC dynamic braking

Variable voltage characteristics-Control of Induction Motor by AC Voltage Controllers – Waveforms – speed torquecharacteristics, Variablefrequencycharacteristics-Variablefrequencycontrol ofinductionmotorbyVoltagesourceand current source inverter and cyclo converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block DiagramOnly)

UNIT - IV

Rotor Side Control of Induction Motor

Static rotor resistance control – closed loop operation of slip ring induction motor with static rotor resistance control -Slip power recovery – Static Scherbius drive – Static Kramer Drive and its closed loop control – advantages, applications, problems.

UNIT - V

Control of Synchronous Motors

self-controlled and separately controlledsynchronous motors – Operation of self-controlled synchronous motorsbyVSI,CSIandcycloconverters.LoadcommutatedCSIfedSynchronousMotor– Operation– Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop speed control scheme for load commutated inverter fed synchronous motor drives (Block Diagram Only)

TEXT BOOKS:

1. "G K Dubey", Fundamentals of Electric Drives, CRC Press,2002.
2. "VedamSubramanyam", Thyristor Control of Electric drives, Tata McGraw Hill Publications, 1987.

REFERENCES:

1. "SKPillai",AFirstcourseonElectricalDrives,NewAgeInternational(P)Ltd.2nd Edition.1989
2. "P. C. Sen", Thyristor DC Drives, Wiley-Blackwell, 1981
3. "B. K. Bose", Modern Power Electronics, and AC Drives, Pearson2015.
4. "R. Krishnan", Electric motor drives - modeling, Analysis and control, Prentice Hall PTR,2001

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B. Tech. (EEE) VI SEMESTER

PC3202EE

SWITCHGEAR AND PROTECTION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNTI-I

PROTECTIVE RELAYS

Introduction, Need for power system protection, effects of faults, evolution of protective relays, zones of protection, primary and backup protection, essential qualities of protection, classification of protective relays and schemes, current transformers, potential transformers, basic relayterminology.

OPERATING PRINCIPLES AND RELAY CONSTRUCTION: Electromagnetic relays, thermal relays, static relays, microprocessor based protectiverelays.

UNTI-II

OVER-CURRENT PROTECTION

Time-current characteristics, current setting, over current protective schemes, directional relay, protection of parallel feeders, protection of ring mains, Phase fault and earth fault protection, Combined earth fault and phase fault protective scheme, Directional earth faultrelay.

DISTANCE PROTECTION: Impedance relay, reactance relay, MHO relay, input quantities for various types of distance relays, Effect of arc resistance, Effect of power swings, effect of line length and source impedance on the performance of distance relays, selection of distance relays, MHO relay with blinders, Reduction of measuring units, switched distance schemes, auto re-closing.

UNTI-III

PILOT RELAYING SCHEMES

Wire Pilot protection, Carrier current protection.

AC MACHINES AND BUS ZONE PROTECTION: Protection of Generators, Protection of transformers, Bus-zone protection, frame leakageprotection.

UNTI-IV

STATIC RELAYS

Amplitude and Phase comparators, Duality between AC and PC, Static amplitude comparator, integrating and instantaneous comparators, static phase comparators, coincidence type of phase comparator, staticover current relays, static directional relay, static differential relay, static distance relays, Multi input comparators, concept of Quadrilateral and Elliptical relay characteristics.

MICROPROCESSOR BASED RELAYS: Advantages, over current relays, directional relays, distance relays.

UNTI-V

CIRCUIT BREAKERS

Introduction, arcing in circuit breakers, arc interruption theories, re-striking and recovery voltage, resistance switching, current chopping, interruption of capacitive current, oil circuit breaker, air blast circuit breakers, SF6 circuit breaker, operating mechanism, selection of circuit breakers, high voltage d.c. breakers, ratings of circuit breakers, testing of circuitbreakers.

FUSES: Introduction, fuse characteristics, types of fuses, application of HRC fuses, discrimination.

TEXT BOOKS:

1. Badriram and D.N. Vishwakarma, Power System Protection and Switchgear, TMH2001.
2. U.A.Bakshi, M.V.Bakshi: Switchgear and Protection, Technical Publications,2009.

REFERENCES:

1. C.Russel Mason – “The art and science of protective relaying, Wiley Eastern,1995
2. L.P.Singh “Protective relaying from Electromechanical to Microprocessors”, New Age International

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B. Tech. (EEE) VI SEMESTER

PC3203EE
POWER SYSTEM OPERATION AND CONTROL

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	1	0	4	External Marks :70

UNIT – I

Economic Operation of Power Systems: Optimal operation of Generators inn thermal Power Stations-heat rate curve-cost curve-incremental fuel and production costs-input/output characteristics-optimum generation allocation with line losses neglected-Optimum generation allocation including the effect of transmission line losses-loss coefficients-general transmission line loss formula.

UNIT- II

Modeling of Turbine: first order turbine model-block diagram representation of steam turbines and approximate linear models and modeling of synchronous generator
Modeling of Governor: Mathematical modeling of speed governing system-derivation of small signal transfer function.
Modeling of Excitation System: Fundamental characteristics of an excitation system-transfer function-block diagram representation of IEEE type-1 model.

UNIT – III

Load frequency control: Necessity of keeping frequency constant-definitions of control area-single area control-block diagram representation of an isolated power system-steady state analysis-dynamic response-uncontrolled case.
Proportional plus integral control of single area and its block diagram representation, steady state response-load frequency control and economic dispatch control.
Load frequency control of 2-area system-uncontrolled case and controlled case-tie line bias control

UNIT – IV

Overview of reactive power control-reactive power compensation in transmission systems-advantages and disadvantages of different types of compensation equipment for transmission systems-load compensation-specifications of load compensator-uncompensated and compensated transmission lines-shunt and series compensation.

UNIT – V

Computer Control of Power Systems: Need of computer control of power systems. Concept of energy control centre (or)load dispatch centre and the functions - system monitoring - data acquisition and control. System hardware configuration – SCADAandEMSfunctions.Networktopology–ImportanceofLoadForecastingandsimpletechniques offorecasting

TEXT BOOKS

1. C.L.Wadhwa,ElectricalPowerSystems,3rdEdn,NewAgeInternationalPublishingCo.,2001.
2. D. P. Kothari and I. J. Nagrath, Modern Power System Analysis, 4thEdn, Tata McGraw Hill Education Private Limited2011.

REFERENCES:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co.2003.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co.2002.
3. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition
4. Electric Energy systems Theory – by O.I.Elgerd, Tata Mc Graw-hill Publishing Company Ltd., Second edition.
5. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill
6. Power System Operation and Control – by G. Sreenivasan; S.Sivanagaraju Published by Pearson Education India,2009

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B. Tech. (EEE) VI SEMESTER

PE3204EE

ELECTRICAL DISTRIBUTION SYSTEM

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT-I

Introduction, Load characteristics. Diversified demand. Non- coincidence demand. Coincidence factor, contribution factor Problems. Rate structure, customer billing, types of distribution transformers.

UNIT-II

Design of Sub-transmission lines and distribution sub-stations. Substation bus schemes, rating of distribution substation, service area with multiple feeders, percent voltage drop Calculations.

UNIT-III

Design considerations of primary systems, radial type, loop type primary feeder, primary feeder loading, uniformly distributed load application to a long line. Design considerations of secondary systems. Secondary banking. Secondary networks. Network transformers, unbalanced loads and voltages.

UNIT-IV

Voltage drop and power loss calculations of 3-phase systems. Voltage fluctuations, measures to reduce flickering. Methods of load flow of Distribution Systems - forward sweep and backward sweep methods.

UNIT-V

Application of capacitors to distribution systems. Effect of series and shunt capacitors, power factor correction, economic justification for capacitors. Best capacitor location-Algorithm. Distribution Automation: Definitions, Components of distribution SCADA.

Suggested Reading

1. Turan Gonen, Electric Power Distribution Engineering, Mc Graw Hill Book Co., International Student Edition. 1986.
2. A.S. Pabla, Electric Power Distribution, Tata McGraw Hill Publishing Company Ltd., 1997.

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B. Tech. (EEE) VI SEMESTER

PE3205EE

ELECTRICAL ENERGY CONSERVATION AND AUDITING

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT-I

Energy Scenario: Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

UNIT-II

Basics of Energy and its various forms: Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT-III

Energy Efficiency in Electrical Systems: Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

UNIT-IV

Energy Efficient Technologies in Electrical Systems: Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.

UNIT-V

Energy Management and Audit: Definition, energy audit, need, types of energy audit. Energy management (audit) approach understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

Suggested Readings:

1. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
2. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3, Electrical Utilities (available online).
3. S. C. Tripathy, *Utilization of Electrical Energy and Conservation*, McGraw Hill, 1991.
4. Success stories of Energy Conservation by BEE, New Delhi (www.bee-india.org).

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B. Tech. (EEE) VI SEMESTER

PE3206EE

HYBRID ELECTRIC VEHICLES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT-I

Introduction : Basics of vehicles mechanisms, history of electric vehicles (EV) and hybrid electric vehicles (HEV), need and importance of EV and HEV, Power/Energy supplies requirements for EV/HEV applications, vehicle power source characterization, and transmission characteristics. Vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design.

UNIT II

Drive-Train Topologies: Review of electric traction, various electric drive-train topologies, basics of hybrid traction system, various hybrid drive-train topologies, power flow control in drive-train topologies, fuel efficiency analysis.

UNIT III

Electrical Machines and Power Converters for Hybrid and Electric Vehicles: Electric system components for EV/HEV, suitability of DC and AC machines for EV/HEV applications, AC and DC Motor drives. Permanent magnet and switch reluctance machines, configuration and control of drives. Power Converters- Converters for EV and HEV applications.

UNIT IV

Energy Sources for EV/HEV: Requirements of energy supplies and storage in EV/HEV, Review of batteries, fuel cells, flywheels and ultra-capacitors as energy sources for EV/HEV, characteristics and comparison of energy sources for EV/HEV, hybridization of different energy sources.

UNIT V

Electric Vehicles Charging Station: Type of Charging station, Selection and Sizing of charging station, Components of charging Stationand Single line diagram of charging station. Contactless inductive charging- Stationary Inductive charging, resonant and compensation circuit topologies.

Suggested Readings*:*

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiely, USA, 2012.
2. Chris Mi, M. Abdul Masrur&David Wenzhong Gao, Hybrid Electric Vehicles: Principles and Applications with Practical Perspective, , Wiely, 2011
3. Iqbal Hussain, Electric & Hybrid Vehicles – Design Fundamentals, 2nd Edition, CRC Press, 2011.
4. SimoraOnori, Hybrid Electric Vehicles Energy Management Strategies, Springer.

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B. Tech. (EEE) VI SEMESTER

PC3208EE
SIGNALS AND LINEAR SYSTEMS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :30
3	0	0	3	External Marks :70

UNIT-I

Introduction to Signals & Systems: Classification of signals, Operations on signals, types of systems, Exponential and Trigonometric Fourier series, Dirichlet's condition.

UNIT-II

Fourier Transform: Representation of aperiodic signal, Introduction of Fourier transform, Convergence, properties of Fourier Transform, Fourier transform of periodic signals, Singularity function, Parseval's theorem, Energy spectral density, Development of Discrete Time Fourier transform, Convergence issues associated with the DTFT.

UNIT-III

Sampling: Sampling of continuous time signals, sampling theorem, Aliasing effect, reconstruction of a signal and its samples.
Convolution & Correlation of signals: Convolution integral, Properties of convolution, Graphical method of convolution, Convolution of Discrete time signals, overlap-add and overlap-save method of discrete convolution, Definition of correlation, Auto correlation, Properties of Autocorrelation, Cross correlation of signals.

UNIT-IV

Laplace Transform: Review of Laplace transforms, region of convergence and properties, poles and zeros, relation between Laplace and Fourier transforms, properties of Laplace transform, inverse Laplace transform, Solutions to differential equation and systembehavior.

UNIT-V

Z Transform: Definition of Z-Transform, Properties of Z-Transform, Region of convergence of Z-Transform, Inverse Z Transform using Inspection, Partial fraction expansion, Power series Expansion, Contour integration methods, Parseval's relation analysis of discrete time systems using Z-Transform. Realization of discrete time system using Direct form, Cascade parallel forms.

Suggested Readings:

1. Alan V. Oppenheim, Alan. S. Willsky, S Hamid Nawab, Signals and Systems, 2nd edition, Prentice Hall of India,2007.
2. Lathi B.P., Signals Systems Communications", 1st edition, B.S. Publications,2006.
3. Simon Haykin and Van veen, "Signal and system", Willy, secondedition.

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B. Tech. (EEE) VI SEMESTER

PC3209EE
MICROPROCESSOR SYSTEMS

UNIT – I
Intel 8086 architecture, Segmented memory, Minimum and Maximum modes of operation, timing diagram, addressing modes, Instruction set, Assembler directives, macros, procedures, assembly language programming using data transfer, arithmetic, logical, branching and string manipulation instructions

UNIT – II
8086 Interrupt structure, IO and Memory Interfacing concepts using 8086, IC Chip Peripherals8255 PPI, 8254 Programmable timer, 8257 DMA controller, 8251 USART .

UNIT – III
8051 Microcontroller – Internal architecture and pin configuration, 8051 addressing modes, instruction set, Bit addressable features. I/O Port structures, assembly language programming using data transfer, arithmetic, logical and branch instructions.

UNIT – IV
8051 Timers/Counters, Serial data communication and its programming, 8051 interrupts, Interrupt vector table, Interrupt programming.

UNIT - V
Real world interfacing of 8051 with external memory, expansion of I/O ports, LCD, ADC, DAC, stepper motor interfacing.

Suggested Readings:

1. Douglas V.Hall, *"Microprocessors and Interfacing Programming and Hardware"*, 2nd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 1994.
2. Ray A.K &Bhurchandi K.M, "Advanced Microprocessor and Peripherals", 2/e TMH, 2012.
3. Walter A.Triebel and Avatar singh, *"The 8088 and 8086 Microprocessors Programming, Interfacing,Software, Hardware and Applications"*, Prentice-Hall of India Private Limited, New Delhi, 1996.
4. Muhammad Ali Mazidi, Janice GillispieMazidi and RolinD.McKinlay, *"The 8051 Microcontroller and Embedded Systems using Assembly and C"*, 2nd Edition, Pearson education, 2009.
5. Manish K. Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill, 2014.

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B. Tech. (EEE) V SEMESTER

PC3210EE
MICROPROCESSOR SYSTEMS LAB

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

List of Experiments:

1. Addition, subtraction using 8085
2. Multiplication and division using 8085
3. Simple programs on 8086 kits
4. Searching and sorting using 8086 assembly language
5. String operations like concatenation and swapping using 8086
6. DAC interface to 8086
7. ADC interface to 8086
8. Stepper motor interface to 8086
9. Study of Keil software for 8051
10. Basic programs using 8051 instructions
11. Flashing LED program using 8051
12. Timer program to generate square wave on ports of 8051

Note: At least ten experiments should be conducted in the Semester.

Suggested Readings:

1. Ramesh S.Gaonkar, *"Microprocessor Architecture programming and Applications with the 8085"*, 5th Edition, Penram International publishing (India) private Limited, 1999.
2. Douglas V.Hall, *"Microprocessors and Interfacing programming and Hardware"*,2nd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 1994.
3. Muhammad Ali Mazidi, Janice GillispieMazidi and RolinD.McKinlay, *"The 8051 Microcontroller and Embedded Systems using Assembly and C*", 2nd Edition, Pearson education, 2009.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) VI SEMESTER

PC3211EE
LINEAR CONTROL SYSTEMS LAB

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks :25
0	0	2	1	External Marks :50

LIST OF EXPERIMENTS

1. Characteristics of D.C. and AC. Servomotor and their transfer function.
2. Characteristics of synchros.
3. Frequency response of second order system.
4. Operating characteristics of Stepper motor.
5. Step response of second order system.
6. D.C. Position control system.
7. A.C. Position control system.
8. Performance of P, PI and PID Controller on system response.
9. Design of lag and lead compensation.
10. ON - OFF temperature control systems.
11. Simulation of control system concepts using MATLAB.
12. PLC (Programmable Logic Controller) applications. (a) Bottle filling (b) Speed control of Stepper motor (c) Liquid level control.
13. Data acquisition system and applications.
14. Industrial process control trainer.

Note: Atleast ten experiments should be conducted in the Semester.

Suggested Reading:

1. Nagrath I.J. &Gopal.M - Control System Engineering, Wiley Eastern, 2003.
2. B.C.Kuo - Automatic Control Systems, Wiley India edition, 7th Edition, 2002.
3. K.Ogata - Modern Control System, Prentice Hall of India, 4th edition, 2002.
4. N.C.Jagan - Control Systems, B.S Publications, 2nd edition,2008.

SUMMER INTERNSHIP

Summer Internship is introduced as part of the curricula for encouraging students to work on problems of interest to industries. A batch of two or three students will be attached to a person from an Electrics/Electronics Industry / R & D Organization / National Laboratory for a period of 6 weeks. This will be during the summer vacation following the completion of the VI semester course. One faculty member will act as an internal guide for each batch to monitor the progress and interacts with the Industry guide.

After the completion of the project, students will submit a brief technical report on the project executed and present the work through a seminar talk to be organized by the department. Also the students have to produce the certificate given by the concern industry before the committee constituted by the department.

One faculty member will co-ordinate the overall activity of Summer Internship.

ANNEXURE

L	:	Lectures
T	:	Tutorials
P	:	Practical's
CIE	:	Continuous Internal Evaluation
SEE	:	Semester End Examination
PC	:	Professional Course
PE	:	Professional Elective
OE	:	Open Elective
HS	:	Humanities& Social Sciences

*Student is required to complete the MOOCS course in electrical and electronics engineering offered by the following agencies. The student is required to take prior approval from the Department, before registering for any course. Unless the student submits a pass certificate, he/she shall not be eligible for the award of degree.

SWAYAM: www.swayam.gov.in , NPTEL: www.onlinecourse.nptel.ac.in

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B. Tech. (EEE) VII SEMESTER

S. No.	Category-Course Code	Course Title	Scheme of Instruction			Contact hr/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1	PC-4101EE	Power System Analysis	3	1	0	4	30	70	4
2	**Professional Elective-III**		3	0	0	3	30	70	3
	PE-4102EE	Flexible AC Transmission System							
	PE-4103EE	Industrial Electrical Systems							
	PE-4104EE	Power System Reliability							
3	**Professional Elective-IV**		3	0	0	3	30	70	3
	PE-4105EE	Digital Control System							
	PE-4106EE	HVDC Transmission System							
	PE-4107EE	Power Quality Engineering`							
4	**Open Elective-I**		3	0	0	3	30	70	3
	OE-4108HS	Disaster Management							
	OE-4109EC	Computer Organization							
	OE-4110EC	Digital Signal Processing							
	OE-4111EC	VLSI Design							
Practical									
5	PC-4112EE	Power Systems Laboratory	0	0	2	2	25	50	1
6	PC-4113EE	Power Electronics and Drives Laboratory	0	0	2	2	25	50	1
7	PW-4114EE	Project Stage-I	0	0	2	2	50	--	1
	Total		**12**	**1**	**6**	**19**	**220**	**380**	**16**

L : Lectures
T : Tutorials
P : Practical's
CIE : Continuous Internal Evaluation
SEE : Semester End Examination
PC : Professional Core
HS : Humanities and Social Sciences

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Department of Electrical & Electronics Engineering

PC-4101EE- POWER SYSTEMS ANALYSIS

Credits:4

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**1**

Branch: **EEE** *CIE*: **30 Marks**

Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

NETWORK TOPOLOGY: Introduction, Elementary graph theory – oriented graph, tree, co-tree, basic cut-sets, basic loops; Incidence matrices – Element-node, Bus incidence, Branch-path incidence matrix, Basic cut-set, Augmented cut-set, Basic loop and Augmented loop; Primitive network – impedance form and admittance form.

UNIT – II

NETWORK MATRICES: Introduction, Formation of Y_{BUS} matrix– by method of inspection (including transformer off-nominal tap setting), by method of singular transformation; Formation of Bus Impedance Matrix by step by step building algorithm

UNIT - III

LOAD FLOW STUDIES: Introduction, Power flow equations, Classification of buses, Operating constraints, Data for load flow; Gauss-Seidal Method – Algorithm and flow chart for PQ and PV buses (numerical problem for one iteration only), Acceleration of convergence; Newton Raphson Method – Algorithm and flow chart for NR method in polar coordinates (numerical problem for one iteration only); Algorithm for Fast Decoupled load flow method; Comparison of Load Flow Methods.

UNIT-IV

SHORT CIRCUIT ANALYSIS: Assumptions in short circuit analysis — Symmetrical short circuit analysis using Thevenin's theorem — Bus Impedance matrix building algorithm (without mutual coupling) — Symmetrical fault analysis through bus impedance matrix — Post fault bus voltages Symmetrical components — Sequence impedances and networks — Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG — Unsymmetrical Fault Analysis: Fault current calculations for LG, LL, LLG faults with and without fault impedance, Numerical Problems

UNIT –V

TRANSIENT STABILITY STUDIES: Numerical solution of Swing Equation – Point-by-point method, Modified Euler‟s method, Runge-Kutta method, Milne‟s predictor corrector method. Representation of power system for transient stability studies – load representation, network performance equations. Solution techniques with flow charts.

TEXT BOOKS:

1. John J.Grainger and Stevenson.W.D, “Power System Analysis”, Tata McGraw Hill, 2003.
2. Wadhwa.C.L, “Electrical Power Systems”, New Age International Private Limited, 2009.
3. Stagg.C.W and Elabiad.A.H, “Computer Methods in Power System Analysis”, Tata McGraw Hill International Book Company, 1990.

REFERENCE BOOKS

1. Hadi Saadat, “Power System Analysis”, Tata McGraw Hill, 2002 .
2. Duncan Glover, Mulukutla.J, Sarma.S and Thomas J. Overbye, “Power System Analysis and Design”, Cengage Learning, 4th Edition, 2009.
3. Nagrath I.J and Kothari D.P, “Modern Power System Analysis”, Tata McGraw Hill, 4th Reprint, 2011.
4. Kundur P, “Power System Stability and Control”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th Reprint 2010.
5. Pai M A, “Computer Techniques in Power System Analysis”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2nd Edition, 2007.

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Department of Electrical & Electronics Engineering

PE-4102EE-FLEXIBLE AC TRANSMISSION SYSTEMS

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**

Branch: **EEE** *CIE*: **30 Marks**

Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

FACTS Concepts: Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, and benefits from FACTS controllers.

UNIT – II

Static Shunt Compensation: Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable var generation, variable impedance type static var generators, switching converter type var generators and hybrid var generators.

UNIT – III

SVC and STATCOM: SVC: FC-TCR and TSC-TCR. STATCOM: The regulation and slope, var reserve control. Comparison between SVC and STATCOM

UNIT – IV

Static Series Compensators: Objectives of Series compensation, concept of series capacitive compensation, GTO thyristor-controlled series capacitor (GCSC), thyristor switched series capacitor (TSSC), thyristor-controlled series capacitor (TCSC) control schemes for GCSC TSSC and TCSC, and operation of SSSC

UNIT – V

Advanced Facts Controllers: Unified Power flow controller (UPFC) - Interline power flow controller (IPFC) - Unified Power quality conditioner (UPQC).

TEXT BOOKS:
1. "N.G. Hingorani and L. Guygi", Understanding FACTS Devices, IEEE Press Publications 2000.
2. "Yong- Hua Song, Allan Johns", Flexible AC Transmission System, IEE Press 1999.
REFERENCE BOOKS:
1. "Kalyan K. Sen and Meylingsen", Introduction to FACTS Controllers, John wiley& sons, Inc., Mohamed E. EI – Hawary Series editor, 2009.
2. "K. R Padiyar, Motilal", FACTS controllers in power transmission and distribution UK Books of India 2007.

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Department of Electrical & Electronics Engineering

PE-4103EE-INDUSTRIAL ELECTRICAL SYSTEMS

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*: **0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

ELECTRICAL SYSTEM COMPONENTS

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safetypractices

UNIT-II

RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT-III

ILLUMINATION SYSTEMS

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT-IV

INDUSTRIAL ELECTRICAL SYSTEMS I

HT connect ion, industrial substation, Transformer select ion, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power

factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panelcomponents.

UNIT-V

INDUSTRIAL ELECTRICAL SYSTEMS II

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

TEXT BOOKS:

1. S.L.UppalandG.C.Garg,"ElectricalWiring,Estimating&costing",Khannapublishers,2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International,2007.

REFERENCES:

1. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co.,1997.
2. Web site for IS Standards.
3. H. Joshi, "Residential Commercial and Industrial Systems" , McGraw Hill Education,2008.

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Department of Electrical & Electronics Engineering

PE-4104EE-POWER SYSTEM RELIABILITY

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

BASIC PROBABILITY THEORY

Elements of probability, probability distributions, Random variables, Density and Distribution functions- Binomial distribution- Expected value and standard deviation - Binomial distribution, Poisson distribution, normal distribution, exponential distribution, Weibull distribution.

DEFINITION OF RELIABILITY: Definition of terms used in reliability, Component reliability, Hazard rate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tub curve, Effect of preventive maintenance. Measures of reliability: Mean Time to Failure and Mean Time between Failures.

UNIT-II

GENERATING SYSTEM RELIABILITY ANALYSIS

Generation system model – capacity outage probability tables – Recursive relation for capacitive model building – sequential addition method – unit removal – Evaluation of loss of load and energy indices – Examples. Frequency and Duration methods – Evaluation of equivalent transitional rates of identical and non-identical units – Evaluation of cumulative probability and cumulative frequency of non-identical generating units – 2-level daily load representation - merging generation and load models – Examples.

UNIT-III

OPERATING RESERVE EVALUATION

Basic concepts - risk indices – PJM methods – security function approach – rapid start and hot

reserve units – Modeling using STPM approach.

BULK POWER SYSTEM RELIABILITY EVALUATION:

Basic configuration – conditional probability approach – system and load point reliability indices – weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

INTER CONNECTED SYSTEM RELIABILITY ANALYSIS

Probability array method – Two inter connected systems with independent loads – effects of limited and unlimited tie capacity - imperfect tie – Two connected Systems with correlated loads – Expression for cumulative probability and cumulative frequency.

UNIT-IV

DISTRIBUTION SYSTEM RELIABILITY ANALYSIS

Basic Techniques – Radial networks –Evaluation of Basic reliability indices, performance indices – load point and system reliability indices – customer oriented, loss and energy-oriented indices – Examples. Basic concepts of parallel distribution system reliability

UNIT-V

SUBSTATIONS AND SWITCHING STATIONS

Effects of short-circuits - breaker operation – Open and Short-circuit failures – Active and Passive failures – switching after faults – circuit breaker model – preventive maintenance – exponential maintenance times.

TEXT BOOKS:

1. ReliabilityEvaluationofPowersystemsbyR.Billinton,R.N.Allan,BSPublications,2007.
2. ReliabilityModelinginElectricPowerSystemsbyJ.Endrenyi,JohnWileyandSons,1978

REFERENCES:

1. Reliability Engineering: Theory and Practice by Alessandro Birolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling, TMH Publications.
3. Reliability Engineering by E. Balaguru swamy, TMH Publications.
4. Reliability Engineering by Elsayed A. Elsayed, Prentice Hall Publications.

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PE-4105EE-DIGITAL CONTROL SYSTEM

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I
DISCRETE REPRESENTATION OF CONTINUOUS SYSTEMS

Basics of Digital Control Systems. Discrete representation of continuous systems. Sample and hold circuit. Mathematical Modeling of sample and hold circuit. Effects of Sampling and Quantization. Choice of sampling frequency. ZOH equivalent.

UNIT-II
DISCRETE SYSTEM ANALYSIS

Z-Transform and Inverse Z Transform for analyzing discrete time systems. Pulse Transfer function. Pulse transfer function of closed loop systems. Mapping from s-plane to z plane. Solution of Discrete time systems. Time response of discrete time system.

STABILITY OF DISCRETE TIME SYSTEM

Stability analysis by Jury test. Stability analysis using bilinear transformation. Design of digital control system with dead beat response. Practical issues with dead beat response design.

UNIT-III

STATE SPACE APPROACH FOR DISCRETE TIME SYSTEMS

State space models of discrete systems, State space analysis. Lyapunov Stability. Controllability, reach- ability, Reconstructibility and observability analysis. Effect of pole zero cancellation on the controllability &observability.

UNIT-IV

DESIGN OF DIGITAL CONTROL SYSTEM

Design of Discrete PID Controller, Design of discrete state feedback controller. Design of set point tracker. Design of Discrete Observer for LTI System. Design of Discrete compensator.

UNIT-V

DISCRETE OUTPUT FEEDBACK CONTROL

Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.

TEXT BOOKS:

1. K. Ogata, “Digital Control Engineering”, Prentice Hall, Englewood Cliffs,1995.
2. M. Gopal, “Digital Control Engineering”, Wiley Eastern,1988.

REFERENCES:

1. G. F. Franklin, J. D. Powell and M. L. Workman, “Digital Control of Dynamic Systems”, Addison- Wesley,1998.
2. B.C. Kuo, “Digital Control System”, Holt, Rinehart and Winston,1980.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PE-4106EE-HVDC TRANSMISSION SYSTEM

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

BASIC CONCEPTS Necessity of HVDC systems, Economics and Terminal equipment of HVDC transmission systems, Types of HVDC Links, Apparatus required for HVDC Systems, Comparison of AC and DC Transmission, Application of DC Transmission System, Planning and Modern trends in D.C. Transmission.

ANALYSIS OF HVDC CONVERTERS: Choice of Converter Configuration, Analysis of Graetz circuit, Characteristics of 6 Pulse and 12 Pulse converters, Cases of two 3 phase converters in Y/Y mode-their performance.

UNIT-II

CONVERTER AND HVDC SYSTEM CONTROL

Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

REACTIVE POWER CONTROL IN HVDC: Introduction, Reactive Power Requirements in steady state, sources of reactive power-Static VAR Compensators, Reactive power control during transients.

UNIT-III

POWER FLOW ANALYSIS IN AC/DC SYSTEMS

Modelling of DC Links, DC Network, DC Converter, Controller Equations, Solution of DC load flow. System for DC quantities, solution of AC-DC Power flow-Simultaneous method-Sequential method.

UNIT-IV

CONVERTER FAULTS AND PROTECTION

Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference.

UNIT-V

HARMONICS

Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics

FILTERS: Types of AC filters, Design of Single tuned filters –Design of High pass filters.

TEXT BOOKS:

1. "K. R. Padiyar", HVDC Power Transmission Systems: Technology and system Interactions, New Age International (P) Limited, and Publishers,1990.
2. "S K Kamakshaiah, V Kamaraju", HVDC Transmission , TMH Publishers,2011

REFERENCES:

1. "S. Rao", EHVAC and HVDC Transmission Engineering and Practice, Khanna publications, 3rd Edition1999.
2. "Jos Arrillaga", HVDC Transmission, The institution of electrical engineers, IEE power& energy series 29, 2nd edition1998.
3. "E. W. Kimbark", Direct Current Transmission, John Wiley and Sons, volume 1,1971.
4. "E. Uhlmann", Power Transmission by Direct Current, B. S. Publications,2009

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Department of Electrical & Electronics Engineering

PE-4107EE-POWER QUALITY ENGINEERING

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

Introduction: Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.

UNIT – II

Long & Short Interruptions: Interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation.
Short interruptions: Definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.

UNIT – III

Single and Three Phase Voltage Sag Characterization: Voltage sag – definition, causes of voltage sag, voltage sag magnitude, and monitoring, voltage sag calculation in non-radial systems, meshed systems, and voltage sag duration. Three phase faults, phase angle jumps, magnitude and phase angle jump for three phase unbalanced sags, load influence on voltage sags.

UNIT – IV

Power Quality Considerations in Industrial Power Systems: Voltage sag – equipment behaviour of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.

UNIT – V

Mitigation of Interruptions & Voltage Sags: Overview of mitigation methods – from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller.

TEXT BOOKS:

1. “Math H J Bollen”, “Understanding Power Quality Problems” , IEEE Press, 2000.
2. “R. Sastry Vedam and Mulukutla S. Sarma”, “Power Quality VAR Compensation in Power Systems”, CRC Press, 2008.

REFERENCE BOOKS:

1. C. Sankaran, Power Quality, CRC Press 2001.
2. Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty, Electrical Power Systems Quality, Tata McGraw Hill Education Private Ltd, 3rd Edition 2012.

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KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

OE-4108HS-DISASTER MANAGEMENT

Credits:3

Class: **B.Tech VII Semester** *Lectures*: 3, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

Introduction & Principles of Disaster Management: Nature - development, hazards and disasters; natural disasters - earth quakes, floods, fire, landslides, cyclones, tsunamis, nuclear; chemical dimensions and typology of disasters - public health disasters, national policy on disaster management

UNIT –II

Prevention Preparedness and Mitigation Measures: Prevention, preparedness & mitigation measures for various disasters, post disaster reliefs and logistics management, emergency support functions and their coordination mechanism, resources and material management, management of relief camp

UNIT– III

Risk and Vulnerability: Building codes and land use planning, social vulnerability, environmental vulnerability, macroeconomic management and sustainable development, climate change, risk rendition, financial management of disaster and related losses

UNIT - IV

Role of Technology in Disaster Management: Disaster management for infrastructures, taxonomy of infrastructure, treatment plants and process facilities, electrical sub stations, roads and bridges, geo spatial information in agriculture, drought assessment, multimedia technology in disaster risk management and training

UNIT-V

Disaster management in India: Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management;

Suggested Readings:

1. Rajib shah and R.R Krishnamurthy, *Disaster management – Global Challenges and local solutions, Hyderabad*: Universities Press (India) Pvt. Ltd., 2009.
2. Satish Modh, *Introduction to Disaster management*, Bengaluru: Macmillan India Ltd., 2010

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OE-4109EC-COMPUTER ORGANIZATION

Credits:3

Class: **B.Tech VII Semester** *Lectures*: 3, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

CPU Organization: Common bus structure, Arithmetic, Logic and Shift Unit using multiplexer, Register, Instructions, Design of CPU.

UNIT-II

Data Path Design: Fixed-Point Arithmetic: Addition, Subtraction, Multiplication:Booth‟s algorithms, Division - Restoring and Non- restoring algorithms, floating point arithmetic and BCD Adder, Shifter: Barrel shifter and Logarithmic shifter,

UNIT-III

Control Design: Basic concepts, Hardwired Control unit design approach: classical and one-hot methods, Micro-programmed Control unit approach: basic concept, micro-program sequencer.

UNIT-IV

Memory and System Organization: Memory Organization: Memory hierarchy, Main memory: RAM, ROM, DRAM, Associative memory, cache memory: principles, address mapping techniques,

UNIT-V

System Organization: communication methods, IO and system control: Programmed IO, DMA and interrupts and Input-Output Processor (IOP)
Advances in Computer Organization: Reduced Instruction Set Computer (RISC): characteristics and architecture, parallel processing, pipeline mechanism

Suggested Reading:

1. Morris Mano M, *Computer System Architecture*, 3rd edition, Prentice Hall India,2007.
2. William Stallings, *Computer Organization and Architecture, Design for Performance*, 7th edition, Prentice Hall India, 2006.
3. John P. Hayes, *Computer Architecture and Organization*, 3rd edition, McGraw Hill,1998.

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Department of Electrical & Electronics Engineering

OE-4110EC-DIGITAL SIGNAL PROCESSING

Credits:3

Class: **B. Tech VII Semester** *Lectures*: 3, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Introduction: Review of Discrete Time Fourier Transform, Concept of frequency in continuous and discrete time signals, DFT and its properties, linear convolution, circular convolution. Computational complexity of direct Computation of DFT, Fast Fourier Transform, DIT and DIF, FFT algorithms for RADIX-2 case

UNIT-II

FIR Filters: FIR digital filter design techniques. Properties of FIR digital filters, design of FIR filters using windows and frequency sampling techniques, linear phase characteristics.

UNIT-III

IIR Filters: Analog filter design – Butterworth and Chebyshev approximations, IIR digital filter design techniques, impulse invariant technique. Bilinear transform technique. Comparison of FIR and IIR filters, frequency transformations.

UNIT- IV

Multirate signal processing: Introduction, decimation by a factor D, interpolation by a factor I, sampling rate conversion by a rational factor I/D, application of Multirate signal processing.

UNIT-V

DSP Processors: Introduction to Fixed point Digital Signal Processors, TMS 320C54XX processor- architecture, addressing modes, Applications of DSP processors.

Suggested Readings:

1. John G.Proakis and Dimitris G. Manolakis, *"Digital Signal Processing principles, Algorithms and Applications"*, 3rd Edition, Prentice-Hall of India Private Limited, New Delhi, 1997.
2. Alan V. Oppenheim and Ronald W. Schafer," Discrete *Time Signal Processing*", 3rd edition, Prentice Hall, Upper Saddle River, NJ,2010
3. Sanjit K. Mitra, "*Digital Signal Processing: A Computer-Based Approach*", 4/e, McGraw-Hill, New York,2011
4. Avatar sing and S.Srinivasan, *"Digital Signal Processing implementation using DSP Microprocessors with Examples from TMS320C54XX"*, Thomson Books Icole, 2004.

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OE-4111EC-VLSI DESIGN

Credits:3

Class: **B.Tech VII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT –I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit ω_o; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT -II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT –III

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT -IV

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.
Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT -V

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.
CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, Contemporary Topics.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, EshraghianDougles and A. Pucknell, PHI, 2005Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson,2009.
3. VLSI Design – M. Michael Vai, 2001, CRCPress

REFERENCEBOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press,2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer,2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition,1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International,2009.
5. Introduction to VLSI – Mead & Convey, BS Publications,2010.

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PC-4112EE- POWER SYSTEMS LAB

Credits:1

Class: **B.Tech VII Semester** *Practical*: **2**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **25 Marks**
Duration of SEE: **3 hours** *SEE*: **50 Marks**

List of Experiments:

1. Performance characteristics of 3-phase transmission line model
2. Determination A B C D parameters of 3-phase transmission line model
3. IDMT Characteristics of an over current (Electromagnetic) Relay
4. Differential protection of single-phase transformer
5. Determination of positive, negative, zero sequence impedances of 3-phase transformers.
6. Determination of positive, negative, zero sequence impedances of 3-phase Alternator.
7. Transient Stability analysis using MATLAB Simulink
8. Fault analysis on an un-loaded 3-phase Alternator.
9. Load Frequency control of single area system using MATLAB Simulink.
10. Load Frequency control of two area system using MATLAB Simulink.
11. Formation of Y_{BUS}.
12. Load Flow Analysis using Gauss Seidal (GS)Method.
13. Load Flow Analysis using Fast Decoupled (FD)Method.
14. Formation of Z_{BUS}.
15. Simulation of Compensated Line
16. Operating characteristics of Directional Over Current Relay

NOTE: Perform any 10 experiments from above list of experiments

TEXT BOOKS:

1. C.L. Wadhwa: Electrical Power Systems –Third Edition, New Age International Pub. Co.,2001.
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co.2002.

REFERENCES:

1. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

PC-4113EE-POWER ELECTRONICS AND DRIVES LAB

Credits:1

Class: **B.Tech VII Semester**
Branch: **EEE**
Duration of SEE: **3 hours**

Practical: **2**, *Tutorial*:**0**
CIE: **25 Marks**
SEE: **50 Marks**

Any eight experiments should be conducted

1. Study of Characteristics of SCR, MOSFET &IGBT,
2. Single Phase AC Voltage Controller with R and RLLoads
3. Single Phase half controlled &fully controlled bridge converter with R and RLloads
4. Forced Commutation circuits (Class A, Class B, Class C, Class D & ClassE)
5. Single Phase Cyclo-converter with R and RLloads
6. Single Phase Bridge inverter with R and RLloads
7. Simulation of 1-phase fully-controlled and half-controlled rectifier fed separately excited DC motor
8. Simulation of open loop or closed loop speed control of 3-phase induction motor using V/f control and using sine PWM

Any two experiments should be conducted from the following

9. DC Jones chopper with R and RLLoads
10. Three Phase half controlled bridge converter withR-load
11. Single Phase dual converter with RLloads
12. (a)Simulation of single-phase Half wave converter using R and RL loads

    (b)Simulation of single-phase full converter using R, RL and RLE loads

    (c)Simulation of single-phase Semi converter using R, RL and RLE loads
13. (a)Simulation of Single-phase AC voltage controller using R and RL loads

    (b)Simulation of Single phase Cyclo-converter with R andRL-loads
14. Simulation of Buck chopper
15. Simulation of single phase Inverter with PWMcontrol
16. Simulation of three phase fully controlled converter with R and RL

loads, with and without freewheeling diode. Observation of waveforms for Continuous and Discontinuous modes of operation.

17. Simulation of closed loop speed control of DC motor with different control schemes (PID, hysteresis current control, Fuzzy, ANFIS etc)
18. Design and simulation of buck, boost and buck-boost converters
19. Simulation of Dual Converter – 4 quadrant operation – separately excited DC motor
20. Simulation of Regenerative Braking – Bidirectional Power Transfer
21. Simulation of Switched Mode Rectifiers – keeping load voltage constant irrespective of line and load variations – closed loop circuit simulation

Text Book:

1. L. Umanand, Power Electronics – Essentials & Applications, Wiley-India.
2. Mohan, Undeland, Robbins, Power Electronics, Converters, Applications & Design, Wiley-India.
3. Muhammad H. Rashid, Power Electronics Circuits, Devices and Applications, Pearson Education.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electrical & Electronics Engineering

B. Tech. (EEE) VII Semester

PC-4114EE- PROJECT STAGE-1

Credits: 1

The department can initiate the project allotment procedure at the end of VI semester and finalize it in the first two weeks of VII semester.

The department will appoint a project coordinator who will coordinate the following:

Collection of project topics/descriptions from faculty members (Problems can also be invited from the industries)
Grouping of students (max 3 in a group) Allotment of project guides.

The aim of project work is to develop solutions to realistic problems applying the knowledge and skills obtained in different courses, new technologies and current industry practices. This requires students to understand current problems in their domain and methodologies to solve these problems. To get awareness on current problems and solution techniques, the first 4 weeks of VII semester will be spent on special lectures by faculty members, research scholars, postgraduate students of the department and invited lectures by engineers from industries and R&D institutions. After completion of these seminars each group has to formalize the project proposal based on their own ideas or as suggested by the project guide.

Seminar schedule will be prepared by the coordinator for all the students from the 5th week to the last week of the semester which should be strictly adhered to.

Each group will be required to:

1. Submit a one-page synopsis before the seminar for display on notice board.
2. Give a 30 minutes presentation followed by 10minutes discussion.
3. Submit a technical write-upon the talk.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

Theseminarpresentationshouldincludethefollowingcomponentsoftheproject:

1. Problem definition and specification
2. Literature survey
3. Broad knowledge of available techniques to solve a particular problem.
4. Planning of the work, preparation of bar (activity) charts
5. Presentation-oral and written.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electrical & Electronics Engineering

B. Tech. (EEE) VIII SEMESTER

S. No.	Category-Course Code	Course Title	Scheme of Instruction			Contact hr/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1	**Professional Elective-V**		3	0	0	3	30	70	3
	PE-4201EE	Non-Conventional Energy Sources							
	PE-4202EE	Special Electrical Machines							
	PE-4203EE	AI Techniques in Electrical Engineering							
2	**Professional Elective-VI**		3	0	0	3	30	70	3
	PE-4204EE	Smart Grid Technologies							
	PE-4205EE	Machine Modelling and analysis							
	PE-4206EE	Modern Power Electronics							
3	**Open Elective-III**		3	0	0	3	30	70	3
	OE-4207ME	Optimization Techniques							
	OE-4208EC	Embedded System Design							
	OE-4209CS	Information Security							
	OE-4210HS	Start-up entrepreneurship							
Practical									
4	PC-4211EE	Electrical Simulation Lab	0	0	2	2	25	50	1
5	PW-4212EE	Project Stage-II	0	0	10	10	150	100	5
	Total		**9**	**0**	**12**	**21**	**265**	**360**	**15**

L : Lectures
P : Practicals
T : Tutorials
CIE : Continuous Internal Evaluation
SEE : Semester End Examination
PC : Professional Core
HS : Humanity Science

PE-4201EE-NON-CONVENTIONAL ENERGY SOURCES

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H_2O_2 Cell - Classification and Block diagram of fuel cell systems - Ion exchange membrane cell - Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system- Regenerative Fuel Cell - Advantages and disadvantages of Fuel Cells-Polarization - Conversion efficiency and Applications of Fuel Cells.

UNIT-II

Solar energy - Solar radiation and its measurements - Solar Energy collectors -Solar Energy storage systems - Solar Pond - Application of Solar Pond - Applications of solar energy.

UNIT-III

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic components of WECS -Classification of WECS -Site selection considerations -Advantages and disadvantages of WECS -Wind energy collectors -Wind electric generating and control systems - Applications of Wind energy -Environmental aspects.

UNIT- IV

Energy from the Oceans - Ocean Thermal Electric Conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices -Advantages and disadvantages of wave energy - Geo-Thermal Energy - Types of Geo-Thermal Energy Systems - Applications of Geo-Thermal Energy.

UNIT-V

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis - Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants - Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation -Thermal gasification of biomass -Biomass gasifiers.

Suggested Readings:

1. Rai G.D, Non-Conventional Sources of Energy, Khandala Publishers, New Delhi, 1999.
2. M.M. El-Wakil, Power Plant Technology. McGraw Hill, 1984.

PE-4202EE -SPECIAL ELECTRICAL MACHINES

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

SYNCHRONOUS RELUCTANCE MOTORS

Constructional features – Types – Axial and Radial flux motors – Operating principles – Variable Reluctance Motors – Voltage and Torque Equations – Phasor diagram – performance characteristics – Applications.

UNIT-II

STEPPER MOTORS

Constructional features – Principle of operation – Variable reluctance motor – Hybrid motor – Single and multi-stack configurations – Torque equations – Modes of excitation – Characteristics – Drive circuits – Microprocessor control of stepper motors – Closed loop control – Concept of lead angle – Applications.

UNIT-III

SWITCHED RELUCTANCE MOTORS (SRM)

Constructional features – Rotary and linear SRM – Principle of operation –Torque production – Steady state performance prediction – Analytical method – power converters and their controllers – Methods of rotor position sensing – Sensor less operation – characteristics and closed loop control – applications.

UNIT-IV

PERMANENT MAGNET BRUSHLESS D.C. (BLDC) MOTORS

Permanent magnet materials – Minor hysteresis loop and recoil line – Magnetic characteristics – Permeance coefficient – Principle of operation – Types – Magnetic circuit analysis – EMF and torque equations – Commutation – Power converter circuits and their controllers – Motor characteristics and control – Applications.

UNIT-V

PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM)

Principle of operation – Ideal PMSM – EMF and torque equations – Armature MMF – Synchronous Reactance – Sine wave motor with practical windings – Phasor diagram – Torque/speed characteristics – Power controllers – Converter volt-ampere requirements – Applications.

TEXT BOOKS:

1. K.Venkataratnam, ‘Special Electrical Machines’, Universities Press (India) Private Limited, 2008.
2. T.J.E. Miller, ‘Brushless Permanent Magnet and Reluctance Motor Drives’, Clarendon Press, Oxford, 1989.
3. T.Kenjo, ‘Stepping Motors and Their Microprocessor Controls’, Clarendon Press London, 1984.

REFERENCES:

1. R.Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application', CRC Press, New York, 2001.
2. P.P. Aearnley, 'Stepping Motors – A Guide to Motor Theory and Practice', Peter Perengrinus London,1982.
3. T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London,1988.
4. E.G. Janardanan, 'Special electrical machines',PHI learning Private Limited, Delhi,2014.

PE-4203EE -AI TECHNIQUES IN ELECTRICAL ENGINEERING

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

ARTIFICIAL NEURAL NETWORKS

Introduction, Models of Neuron Network-Architectures –Knowledge representation, Artificial Intelligence and Neural networks–Learning Process-Error correction learning, Hebbian learning – Competitive learning-Boltzmann learning, supervised learning-Unsupervised learning– Reinforcement learning-Learning tasks.

UNIT-II

ANN PARADIGMS

Multi-layer perceptron using Back propagation Algorithm (BPA), Self –Organizing Map (SOM), Radial Basis Function Network-Functional Link Network (FLN), Hopfield Network.

UNIT-III

FUZZY LOGIC

Introduction –Fuzzy versus crisp, Fuzzy sets-Membership function –Basic Fuzzy set operations, Properties of Fuzzy sets –Fuzzy Cartesian Product, Operations on Fuzzy relations –Fuzzy logic– Fuzzy Quantifiers, Fuzzy Inference-Fuzzy Rule based system, Defuzzification methods.

UNIT-IV

GENETIC ALGORITHMS

Introduction-Encoding –Fitness Function-Reproduction operators, Genetic Modeling –Genetic operators- Cross over-Single site cross over, two-point cross over –Multi point cross over Uniform cross over, Matrix cross over-Cross over Rate-Inversion & Deletion, Mutation operator –Mutation –Mutation Rate- Bit-wise operators, Generational cycle-convergence of Genetic Algorithm.

UNIT-V

APPLICATIONS OF AI TECHNIQUES

Load forecasting, Load flow studies, Economic load dispatch, Load frequency control, Single area system and two area system, Reactive power control , Speed control of DC and AC Motors.

TEXT BOOKS

1. S.Rajasekaran and G.A.V.Pai Neural Networks, Fuzzy Logic &GeneticAlgorithms,PHI, New Delhi,2003.
2. Rober J. Schalkoff, Artificial Neural Networks, Tata McGraw Hill Edition,2011.

REFERENCES:

1. P.D.Wasserman; Neural Computing Theory & Practice, Van Nostrand Reinhold, New York, 1989.
2. Bart Kosko; Neural Network & Fuzzy System, PrenticeHall,1992
3. D.E.Goldberg, Genetic Algorithms, Addison-Wesley 1999.

PE-4204EE -SMART GRID TECHNOLOGIES

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Introduction to Smart Grid: Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions-comparison of Power Grid and Smart Grid-New Technologies for Smart Grid – Advantages – Present development and international policies in Smart Grid, Indian Smart Grid. Key Challenges for Smart Grid. Components and Architecture of Smart Grid-Description.

UNIT-II

DC Distribution and Smart Grid: AC Vs DC Sources-Benefits of and drives of DC power delivery systems – Powering equipment and appliances with DC-Data centers and information technology loads equipment and appliances with DC-Data centers and information technology loads – Future neighbourhood Potential future work and research.

UNIT-III

Smart Grid Communications and Measurement Technology: Communication and Measurement – Monitoring, Phasor Measurement Unit (PMU), Smart Meters, Wide area measurement System (WAMS).

UNIT-IV

Renewable Energy and Storage: Introduction to Renewable Energy Technologies-Micro Grids-Storage Technologies-Electric Vehicles and plug-in Hybrids-Environmental impact and Climate Change-Economic Issues. Grid integration issues of renewable energy sources.

UNIT-V

Smart Power Grid System Control: Load Frequency Control (LFC) in Micro Grid System – Voltage Control in Micro Grid System, Reactive Power Control in Smart Grid.

Suggested Readings:

1. Stuart Borlase, Smart Grids, Infrastructure, Technology and Solutions, CRC Press, 2013.
2. A.G. Phadke and J.S. Thorp, “Synchronized Phasor Measurements and their Application”, Springer Edition, 2010.
3. Iqbal Hussein, “Electric and Hybrid Vehicle: Design fundamentals”, CRC Press, 2003.
4. Gil Masters, Reneable and Efficient Electric Power System, Wiley-IEEE Press, 2004.
5. Fereidoon P. Sioshansi, “Smart Grid: Integrating Renewable, Distributed & Efficient Energy”, Academic Press, 2012.
6. Jean Claude Sabonnadiere, NouredineHadjsaid, “Smart Grids”. Wiley-ISTE, IEEE Press, May 2012

PE-4205EE - MACHINE MODELLING AND ANALYSIS

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Basic Two-pole DC machine - primitive 2-axis machine – Voltage and Current relationship – Torque equation.

UNIT-II

Mathematical model of separately excited DC motor and DC Series motor in state variable form – Transfer function of the motor - Numerical problems. Mathematical model of D.C. shunt motor D.C. Compound motor in state variable form – Transfer function of the motor - Numerical Problems

UNIT-III

Liner transformation – Phase transformation (a, b, c to α, β, o) – Active transformation (α .β, o to d, q). Circuit model of a 3 phase Induction motor – Linear transformation - Phase Transformation – Transformation to a Reference frame – Two axis models for induction motor. dq model based DOL starting of Induction Motors.

UNIT-IV

Voltage and current Equations in stator reference frame – equation in Rotor reference frame – equations in a synchronously rotating frame – Torque equation - Equations I state – space form.

UNIT-V

Circuits model of a 3ph Synchronous motor – Two axis representation of Synchronous Motor. Voltage and current Equations in state – space variable form – Torque equation. dq model based short circuit fault analysis-emphasis on voltage, frequency and recovery time.

TEXT BOOKS:

1. Analysis of electric machinery and Drive systems- Paul C. Krause , Oleg Wasynezuk, Scott D. Sudhoff, third edition, IEEE press
2. Generalized Machine theory P.S. Bimbhra, Khanna Publishers, 2002

REFERENCES:

1. Thyristor control of Electric Drives - Vedam Subramanyam, Tata McGraw-Hill Education, 1988
2. Power System Stability and Control – Prabha Kundur, EPRI.

PE-4206EE -MODERN POWER ELECTRONICS

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

High-Power Semiconductor Devices: Introduction, High-Power Switching Devices, Diodes, Silicon-Controlled Rectifier (SCR), Gate Turn-Off (GTO) Thyristor, Gate-Commutated Thyristor (GCT), Insulated Gate Bipolar Transistor (IGBT), Other Switching Devices, Operation of Series-Connected Devices, Main Causes of Voltage Unbalance, Voltage Equalization for GCTs.

UNIT-II

Cascaded H-Bridge Multilevel Inverters: Introduction, Sinusoidal PWM, Modulation Scheme, Harmonic Content, over modulation, Third Harmonic Injection PWM, Space Vector Modulation, Switching States, Space Vectors, Dwell Time Calculation, Modulation Index, Switching Sequence, Spectrum Analysis, Even-Order Harmonic Elimination, Discontinuous Space Vector Modulation. Introduction, H-Bridge Inverter, Bipolar Pulse-Width Modulation, Unipolar Pulse-Width Modulation.

UNIT – III

Diode-Clamped Multilevel Inverters: Three-Level Inverter, Converter Configuration, Switching State ,Commutation, Space Vector Modulation, Stationary Space Vectors , Dwell Time Calculation, Relationship Between V_refLocation and Dwell Times, Switching Sequence Design, Inverter Output Waveforms and Harmonic Content , Even-Order Harmonic Elimination, Neutral-Point Voltage Control, Causes of Neutral-Point Voltage Deviation, Effect of Motoring and Regenerative Operation, Feedback Control of Neutral-Point Voltage

UNIT – IV

DC-DC Switch-Mode Converters & Switching DC Power Supplies Control of dc-dc converter, Buck converter, boost converter, buck-boost converter, cuk dc-dc converter, full bridge dc-dc converter, dc-dc converter comparison. Introduction, linear power supplies, overview of switching power supplies, dc-dc converters with electrical isolation, control of switch mode dc power supplies, power supply protection, and electrical isolation in the feedback loop, designing to meet the power supply specifications.

UNIT – V

Resonant Converters & Power Conditioners and Uninterruptible Power Supplies Classification of resonant converters, basic resonant circuit concepts, load-resonant converters, resonant-switch converters, zero-voltage-switching, resonant-dc-link inverters with zero-voltage switching's, high frequency-link integral-half cycle converters. Power line disturbances, Introduction to Power Quality, power Conditioners, uninterruptible power supplies, Applications.

Text Books:

1. “M. H. Rashid”, Power electronics circuits, Devices and applications, PHI, I edition – 1995.
2. “Ned Mohan, Tore M. Undeland and William P. Robbins, A”, “Power Electronics converters, Applications and Design” John Wiley & Sons, Inc., Publication, 3rd Edition 2003

Reference Books:

1. “Bin Wu, A”, “High-Power Converters and Ac Drives” John Wiley & Sons, Inc., Publication (Free down load from rapidshire.com) 2006.

OE-4207ME-OPTIMIZATION TECHNIQUES

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Introduction: Statement of an optimization problem, Classification of optimization problems, Overview of various optimization Techniques, Properties of vectors, norms, positive semi-definite matrices.

UNIT-II

Classical optimization techniques: Single variable optimization, Multivariable optimization, Convexity and concavity of functions of one and two variables, convex optimization problems, the simplex optimization technique, Test Functions.

UNIT-III

Unconstrained optimization: General properties of minimization algorithms, Line search, the gradient method, Newton's method, least square Algorithm.
Constrained optimization: Active constraints versus inactive constraints, transformations

UNIT-IV

Genetic algorithm (GA): Fundamentals of Genetic algorithm, History, Basic concepts, working principle, Applications of GA.
Swarm intelligence: Basic particle swarm optimization, initialization techniques, Theoretical investigations and parameter selection, Design of PSO algorithm using computational statistics, Application of PSO.

UNIT-V

Differential Evolution: Classical differential evolution- An outline, Mutation, cross over, selection, Teaching learning based optimization (TLBO), applications of TLBO for standard Bench mark test functions.

Suggested Readings:

1. Richard W Daniels, An Introduction to Numerical Methods and Optimization Techniques, Elsevier North Holland Inc,
2. S Rajasekharan, G.A Vijaya Lakshmi Pai, Neural Networks, Fuzzy logic, and Genetic algorithms, Synthesis and Applications, Prentice hall of India, 2007
3. Rao, S.S., *"Engineering Optimization: Theory and Practice",* John Wiley & Sons, Inc., 2009
4. Taha, H.A., *"Operations Research, Pearson Education India",* New Delhi, India, 2008.
5. Randy L. Haupt and Sue Ellen Haupt, *"Practical genetic algorithms"* second edition, a John Wiley & sons, inc., publication -2004.

OE-4208EC-EMBEDDED SYSTEM DESIGN

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT-I

Introduction to Embedded Systems: The Embedded Design Life Cycle - Product Specification, Hardware/Software Partitioning, Iteration and Implementation, Detailed Hardware (selection of processor) and Software Design, Hardware/Software Integration, Product Testing and Release, Maintenance and Upgradation.

UNIT-II

ARM Embedded Systems: The RISC design philosophy, The ARM design philosophy, ARM processor fundamentals, registers, current program status register, pipeline, exceptions, interrupts, and vector table

UNIT-III

Embedded processing with ARM CORTEX on Zynq: Fundamentals of FPGA, types of FPGA, case study of Xilinx FPGA, Processing System, programmable logic, programmable logic interfaces, security,

UNIT-IV

Embedded Software Development Tools: Host and Target Machines, Cross Compilers, Cross Assemblers, Tool Chains, Linkers/Locators for Embedded Software, Address Resolution, Locator Maps.

UNIT-V

Introduction to Real Time Operating Systems: Tasks and task states, tasks and Data, Semaphores and shared data. Operating system services: Message queues, mailboxes and pipes, timer functions, events, memory management,

Suggested Readings:

1. Arnold S Berger, "*Embedded Systems Design*", South Asian edition, CMP Books, 2005.

2. Andrew Sloss, Dominic Symes, Chris Wright, *"ARM System Developer's Guide: Designing and Optimizing System Software"*, Elsevier, 2004.

3. Louise H Crockett, Ross.A.Elliot et *al " The Zynq Book*" , Edition 1, Strathclyde academic media, July 2014.

4. David E Simon, *"An Embedded software primer"*, Pearson, 2012

OE-4209CS -INFORMATION SECURITY

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT – I

Introduction: Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, Threats, A model for Network Security.

UNIT – II

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques (mono-alphabetic cipher, poly-alphabetic, one-time pad) encryption and decryption, symmetric and asymmetric key cryptography, key range and key size

UNIT – III

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, RC4), Key distribution in symmetric system

UNIT – IV

Asymmetric key Ciphers: Principles of public key crypto systems, Public key Algorithms: RSA, Diffie-Hellman, ECC, Key Distribution Key in asymmetric system.

UNIT – V

Authentication: Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure Hash Algorithm-1, Digital signatures, MD5.

Text Books

1. Cryptography and Network Security : William Stallings, Pearson Education,4″‘ Edition
2. Information Security, Principles and Practice: Mark Stamp, Wiley India.

References

1. Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India,1”Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2″” Edition.
3. Cryptography and Network Security : Atul Kahate, Mc Graw hill Edition.
4. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.

OE-4210HS-START-UP ENTERPRENEURSHIP

Credits:3

Class: **B. Tech VIII Semester** *Lectures*: **3**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **30 Marks**
Duration of SEE: **3 hours** *SEE*: **70 Marks**

UNIT–I

Creativity &Discovery: Definition of Creativity, self-test creativity, discovery and delivery skills, the imagination threshold, building creativity ladder, Collection of wild ideas, Benchmarking the ideas, Innovative to borrow or adopt, choosing the best of many ideas, management of tradeoff between discovery and delivery

UNIT– II

From Idea to Startup: Introduction to think ahead backward, Validation of ideas using cost and strategy, visualizing the business through value profile, activity mapping, Risks as opportunities, building your own roadmap

UNIT– III

Innovation career lessons: Growing & Sharing Knowledge, The Role of Failure In Achieving Success, Creating vision, Strategy, Action Resistance: Differentiated Market Transforming Strategy; Dare to Take Action; Fighting Resistance; All About the startup Ecosystem; Building a Team; Keeping it Simple and Working Hard.

UNIT–IV

Action driven business plan: Creating a completed non-business plan, including a list of the activities to be undertaken, with degrees of importance. A revision of the original product or service idea, in light of information gathered in the process, beginning to design the business or organization that will successfully implement your creative idea.

UNIT–V

Startup financing cycle: Preparing an initial cash flow statement, showing money flowing out and flowing in. Estimateyourcapitalneedsrealistically.Prepareabootstrappingoption(self-financing). Prepare a risk map. Prepare a business plan.

Suggested Readings:

1. VasantDesai,*"DynamicsofEntrepreneurialDevelopmentandManagement"*, HimalayaPublishingHouse, 1997.
2. PrasannaChandra,*"Project–Planning, Analysis,Selection,ImplementationandReview",*TataMcGraw-HillPublishingCompanyLtd.,1995.
3. B.Badhai,"*EntrepreneurshipforEngineers*",DhanpathRai&Co.,Delhi,2001.
4. StephenR.CoveyandA.RogerMerrill,"*FirstThingsFirst",*SimonandSchuster,2002.
5. RobertD.HisrichandMichaelP.Peters,*"Entrepreneurship*",TataMcGrawHillEdition, 2002.

PC-4211EE -ELECTRICAL SIMULATION LAB

Credits:1

Class: **B. Tech VIII Semester** *Practical*: **2**, *Tutorial*:**0**
Branch: **EEE** *CIE*: **25 Marks**
Duration of SEE: **3 hours** *SEE*: **50 Marks**

Simulation experiments should be conducted in the area of Electrical Circuits, Power Systems, Control Systems and Electrical Drives using software like MATLAB/Simulink/PSPICE/PSIM/MIPOWER/PSCAD etc.,

I. Electrical Circuits:

1. Transient Response of series RLC, RL & RC circuits with sine and step inputs
2. Series and Parallel resonance
3. Verification of Network Theorems
    a. Thevenin's theorem
    b. Superposition theorem
    c. Maximum Power Transfer theorem

II. Power Systems:

4. Load flow analysis
5. Fault analysis
6. Transient Stability Studies

III. Control Systems:

7. Bode plot, Root-Locus plot and Nyquist Plot
8. Transfer Function analysis of a) Time response for step input (ii) Frequency response for Sinusoidal input.
9. Design of Lag, Lead and Lag-Lead compensators

IV. Electrical Drives:

10. Chopper fed DC Motor Drive
11. VSI/CSI Fed Induction Motor Drives, doubly fed Induction Motor, PWM
12. Control of BLDC Motor

B. Tech. (EEE) VIII Semester

OE-4212EE-PROJECT STAGE – II

Credits: 5

The aim of project work–II is to implement and evaluate the proposal made as part of project–I. Students can also be encourage to do full time internship as part of project work-II based on the common guidelines for all the departments. The students placed in internships need to write the new proposal in consultation with industry coordinator and project guide within two weeks from the commencement of instruction.

The department will appoint a project coordinator who will coordinate the following:

1. Re-grouping of students-deletion of internship candidates from groups made as part of project work-I
2. Re-Allotment of internship students to project guides
3. Project monitoring at regular intervals

All re-grouping/re-allotment has to be completed by the 1nd week of VIII semester so that students get sufficient time for completion of the project.

All projects (internship and departmental) will be monitored at least twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well as by the supervisor. The first review of projects for 75 marks can be conducted after completion of five weeks. The second review for another 75 marks can be conducted after 12 weeks of instruction.

Common norms will be established for the final documentation of the project report by the respective departments. The students are required to submit draft copies of their project report within one week after completion of instruction.