Faculty of Engineering & Technology

Study and Evaluation Scheme

Of

Bachelor of Technology

B.Tech. – Electrical Engineering

(Applicable w.e.f Academic Session 2016-18, till revised)

AKS UNIVERSITY, SATNA

Study and Evaluation Scheme

**** The University Authorities reserve all the rights to make any additions/ deletions or changes/ modifications to this syllabus as deemed necessary.**

Faculty of Engineering & Technology
Department of Electrical Engineering
2015 Batch

B.Tech

(Electrical Engg.)

III Semester

TEACHING & EXAMINATION SCHEME

S.No.	Paper Code	Subjects	L	T	P	Credit	Total Credit
1.	03MS301	Engineering Mathematics-III	3	1		4	27
2.	03EE302	Electrical Machine-I	3	1		4	
3.	03EE303	Electrical Power Generation	2	1		3	
4.	03EE304	Electrical And Electronic Materials	3	1		4	
5.	03EE305	Network Analysis And Synthesis	3	1		4	
6.	03EE306	Solid State Devices	3	1		4	
1.	03EE351	Electrical Machine-I (Lab)			2	1	
2.	03EE352	Solid State Devices (Lab)			2	1	
3.	03EE353	Network Analysis And Synthesis (Lab)			2	1	

Faculty of Engineering & Technology
Department of Electrical Engineering

2015 Batch

B.Tech

(Electrical Engg.)

IV Semester

TEACHING & EXAMINATION SCHEME

S.NO.	SUBJECT CODE	SUBJECT NAME	L	T	P	CREDIT
1.	03EE401	ELECTRICAL MACHINE –II	4	1		5
2.	03MT402	PRINCIPAL OF MANAGEMENT	3	1		4
3.	03EE403	ELECTROMAGNETIC THEORY	3	1		4
4.	03EE404	ELECTRICAL MEASUREMENT AND INSTRUMENT	4	1		5
5.	03EE405	POWER TRANSMISSION AND DISTRIBUITION	4	1		5
6.	03EE451	POWER TRANSMISSION AND DISTRIBUITION (Lab)			2	1
7.	03EE452	ELECTRICAL MACHINE –II(Lab)			2	1
8.	03EE453	ELECTRICAL MEASUREMENT AND INSTRUMENT (Lab)			2	1
		TOTAL	18	5	6	26

Faculty of Engineering & Technology
Department of Electrical Engineering
2015 Batch

B.Tech

(Electrical Engg.)

V Semester

TEACHING & EXAMINATION SCHEME

S.No.	Paper Code	Subjects	L	T	P	Credit	Total Credit
1.	03EE501	Analog And Digital Communication	3	1		4	28
2.	03EE502	Analog And Digital Electronics	3	1		4	
3.	03EE503	Electronic Instrumentation	3	1		4	
4.	03EE504	Power Electronics	3	1		4	
5.	03EE505	Switchgear And Protection	3	1		4	
6.	03EE506	EHV AC and DC Transmission	2	1		3	
1.	03EE551	Analog And Digital Electronics (Lab)			2	1	
2.	03EE552	Electronic Instrumentation (Lab)			2	1	
3.	03EE553	Switchgear And Protection (Lab)			2	1	
4.	03EE554	Power Electronics (Lab)			2	1	
5.	03EE556	Analog and Digital Communication			2	1	

Faculty of Engineering & Technology
Department of Electrical Engineering
2015 Batch

B.Tech (Electrical Engg.)

VI Semester

TEACHING & EXAMINATION SCHEME

S.No.	Subject Code	Subject Name	L	T	P	Credit	Total Credit
1.	03EE601	Electrical Drives	4	1		5	29
2.	03EE602	Electrical Machine Design	4	2		5	
3.	03EE603	Control Systems	4	1		5	
4.	03EE604	Microprocessor And Microcontroller	4	1		5	
5.	03EE605	Signal And System	3	1		4	
1.	03EE651	Electrical Drives (Lab)			2	1	
2.	03EE653	Control Systems (Lab)			2	1	
3.	03EE653	Microprocessor And Microcontroller (Lab)			2	1	
4.	03EE654	Electrical Machine Design Lab CAD Based			2	1	
5.	03EE655	Simulation Lab (MATLAB)			2	1	

Faculty of Engineering & Technology
Department of Electrical Engineering
2015 Batch

B.Tech (Electrical Engg.)

VII Semester

TEACHING & EXAMINATION SCHEME

S.No.	Subject Code	Subject Name	L	T	P	Credit	Total Credit
1.	03EE701	Energy Conservation And Management	3	1		4	30
2.	03EE702	Power System Analysis And Control	4	1		5	
3.	03EE703	Utilization Of Electrical Power	4	1		5	
4.		Elective-1	4	1		5	
5.		Elective-2	4	1		5	
1.	03EE751	Power System Analysis And Control (Lab)			2	1	
2	03EE754	Energy Conservation And Management Lab			2	1	
3	03EE752	Major Project (Planning And Literature Survey)			6	3	
4.	03EE753	Industrial Training (2 weeks)			4	2	

s.no	Code	Elective-1
1.	03EE704-A	Planning for sustainable Development
2	03EE704-B	SCADA System and Application
3	03EE704-C	FACTS
4	03EE704-D	Electrical Estimating And Costing

s.no	Code	Elective-2
1	03EE705-A	HIGH VOLTAGE ENGINEERING
2	03EE705-B	GENERALISED THEORY OF MACHINES
3	03EE705-C	Advance Power Electronics
4	03EE705-D	Knowledge Entrepreneurship

Faculty of Engineering & Technology
Department of Electrical Engineering
2015 Batch

B.Tech (Electrical Engg.)

VIII Semester

TEACHING & EXAMINATION SCHEME

S.No.	Subject Code	Subject Name	L	T	P	Credit	Total Credit
1.	08EE851	Major Project			30	15	15

B.TECH. (Electrical Engineering)
III SEMESTER
ENGINEERING MATHEMATICS-III

Unit – I: Function of Complex variable

- Definition, derivatives of complex function, Analytic function.
- Cauchy-Riemann equations, in Cartesian form and polar form.
- Conjugate function, Harmonic function, Methods for finding the analytic function.
- Cauchy's integral theorem, Cauchy's integral formula for analytic function.
- Poles and singularities of analytic function, Residue theorem (without proof) and its application.

Unit – II: Numerical Techniques – I

- Finite differences: Difference table [Forwarded Difference operator, Backward Difference operators and central Difference operator]
- Interpolation**:** Newton-Gregory forward and backward interpolation formula for equal intervals, Gauss's forward and backward interpolation formula for equal intervals, Gauss's central difference formula for equal intervals.
- Stirling's formula, Bessel's formula, Everett's formula for equal intervals.

Unit – III: Numerical Techniques – II

- Numerical Differentiation : Newton's forward difference formula and Newton's backward difference formula for derivative, Gauss's forward difference formula for derivative, Newton's divide difference formula for derivative.
- Lagrange's interpolation formula for unequal intervals and Newton's divided difference interpolation for unequal intervals.
- Numerical integration: Trapezoidal rule, Simpson's one third rule, Simpson's three-eight rules, and Weddle's rule.

.**Unit – IV Numerical Techniques –III**

Numerical solution of algebraic and Transdantal equations: Bisection method, Secant method, Regular-falsi method, Newton-Raphson method and Graeffe's root squaring method.

- Numerical solution of ordinary differential equations: Taylor's series method, Euler's method, Euler's modified method, Picard's method, Runge- Kutta method.
- Solution of simultaneous algebraic equation: Gauss- Seidal method, Gauss elimination method, Guass-jordan method.

Unit – V Probability Distribution

- Binomial Distribution: Hypothesis, characteristics, mean, variance and standard deviation and moments.
- Poisson distribution: Hypothesis, characteristics, condition for Poisson distribution, mean, variance and standard deviation.
- Normal Distribution: Standard normal distribution, properties of normal curve.
- Curve fitting: Method of least squares, Fitting of straight lines, and parabola of second degree.

Text Books:

1. D.C. Agrawal, Engineering Mathematics-III, Sai prakasan
2. H.K.Das, Basic Engineering Mathematics-III, S.Chand & company Ltd.
3. D. K. Jain., Engineering Mathematics-III
4. Sonendra Gupta, Engineering Mathematics-III, Dhanpat Rai Publishing Company(P) Ltd.

Reference Books:-

1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. Chandrika Prasad, Advanced Mathematic for Engineers, Prasad Mudranalaya,1996.
4. B.V.Ramana,Higher Engineering mathematics,Tata Mcgraw-Hills Publishing Company Limited.

B.TECH. (Electrical Engineering)
III SEMESTER
NETWORK ANALYSIS AND SYNTHESIS

Unit – I: Graph Theory
Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Nodal methods of analysis

Unit – II: Network Theorems (Applications to ac networks)
Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

Unit – III : Network Functions
Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot.

Unit – IV : Two Port Networks
Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & Π Representation.

Unit – V : (a) Network Synthesis
Positive real function; definition and properties; properties of LC, RC and RL driving point functions.
(b) Filters: Characteristics, impedance, passive and active filter fundamentals, low pass, highpass, (constant K type) filters, and introduction to active filters.

Text Books:

1 M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2 A.Chakrabarti, "Circuit Theory" Dhanpat Rai & Co.
3 C.L Wadhwa, "Network Analysis and Synthesis" New Age International Publishers,
4 D.Roy Choudhary, "Networks and Systems" Wiley Eastern Ltd.
5 Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill

Reference Books:

6 M.E. Van Valkenburg, "An Introduction to Modern Network Synthesis",Wiley Eastern Ltd
7 N.C. Jagan and C. Lakshminarayana, "Newwork Analysis" B.S. Publications, 2008.
8 K.S. Suresh Kumar, "Electric Circuits and Networks" Pearson Education, 2009.
9 A Ramakalyan, "Linear Circuits: Analysis and Synthesis" Oxford University Press, 2005.

LIST of EXPERIMENTS

1. To observe Response of R,L and C to A.C supply. Observe the current and voltage wave forms on C. R. O. and determine magnitude and phase angle of voltage and current.
2. To verify the superposition theorem applicable to D.C. circuit.
3. To verify Thevenins theorem applicable to D.C circuit
4. To verify Norton's theorem applicable to D.C circuit
5. To verify the maximum power transfer Theorem applicable to D.C. circuit.
6. Determination of z and h parameters for network and computation of y and ABCD parameters.
7. Determination of driving point and transfer functions of two port network ladder network and verify with theoretical values
8. Verification of parameter properties in interconnected two port networks series, parallel and cascade also study loading effect in cascade.
9. To determine attenuation characteristics of a low pass / high pass active filters

B.TECH. (Electrical Engineering)

III SEMESTER
ELECTRICAL MACHINE-I

Unit – I
Principles of Electro-mechanical Energy Conversion- Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems (defining energy & Co-energy), Singly excited systems; Determination of mechanical force, Mechanical energy, Torque equation, Doubly excited Systems; Energy stored in magnetic field, Electromagnetic torque , Generated emf in machines; Torque in machines with cylindrical air gap. (7)

Unit – II
D.C. Machines- Construction of DC Machines, Armature winding, Emf and torque equations, Armature reaction, Commutation, Interpoles and compensating windings, Performance characteristics of D.C. generators. (9)

Unit –III
D.C. Machines (Contd.)- Performance characteristics of D.C. motors, Starting of D.C. motors; 3 point and 4 point starters, Speed control of D.C. motors; Field control, Armature control and Voltage control (Ward Lenonard method); Efficiency and Testing of D.C. machines (Hopkinson's and Swinburn's Test). (8)

Unit – IV
Single Phase Transformer- Phasor diagram, Efficiency and voltage regulation, All day efficiency.
Testing of Transformers- O.C. and S.C. tests, Sumpner's test, Polarity test.
Auto Transformer- Single phase and three phase auto transformers, Volt-amp relation, Efficiency, Merits & demerits and applications. (8)

Unit – V
Three Phase Transformers - Construction, Three phase transformer, Phasor groups and their connections, Open delta connection, Three phase to 2 phase, 6 phase or 12 phase connections and their applications, Parallel operation of single phase and three phase transformers and load sharing, Excitation phenomenon and harmonics in transformers, Three winding transformers. (9)

Text Books:
1 I.J. Nagrath & D.P.Kothari, " Electrical Machines", Tata McGraw
Hill 2 Husain Ashfaq , " Electrical Machines", Dhanpat Rai & Sons
3 P.S.Bimbhra, "Electrical Machinery", Khanna Publisher
4. A.E. Fitggerald, C.Kingsley Jr and Umans, "Electric Machinery", McGraw Hill, International Student Edition.
Reference Books:
5 Irving L.Kosow, "Electric Machine and Tranformers", Prentice Hall of India. 6
M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.
7 P.S. Bimbhra, " Generalized Theory of Electrical Machines", Khanna Publishers

LIST of EXPERIMENTS

1. Study of D.C. Machine (Parts)
2. Open characteristics(E_b/ I_f) of a D.C. Generator
    a. Series
    b. Shunt
    c. Compound
3. External characteristics of D.C. Generator (V/I_l).
4. Control the speed of D.C. Series motor.
5. Perform Swinburn's test of D.C. machine.
6. Perform O.C. & S.C. test of single phase transformer.
7. Perform Load test on single phase transformer.
8. Operate two single phase transformer in parallel having.
9. Perform sumpner's test on single phase transformer.
10. Perform heat run test of single phase transformer.

Prepare a report on transformer accessories and cooling methods of a substation

B.TECH. (Electrical Engineering)

III SEMESTER
SOLID STATE DEVICES

UNIT I
Diodes characteristics, equivalent circuit, Junction capacitance of diode and applications as Clipping, Clamping circuits, Voltage doublers, special purpose diodes- photodiode, LED, tunnel diode, Varactor diode, pin diode**.**

UNIT II
Diode Applications Rectifiers: half wave and full wave bridge rectifier circuit , filters for rectifiers. Shunt, Series & Zener voltage regulators**.**

UNIT III
Input and output characteristics of transistor circuits, various Biasing - Purpose of biasing, dc operating point, dc load line, different biasing techniques – Base bias, Emitter bias, Voltage divider bias, Collector feedback bias, Thermal Runaway, Thermal stability. ac load line, graphical analysis, current, voltage & power gain, input and output impedance, analysis using h-parameters, cascading.

UNIT IV
FET & MOSFET- The JFET, pinch off voltage, JFET V-I characteristics, FET small signal model, depletion mode MOSFET, enhancement mode MOSFET, low frequency common source and common drain amplifiers, FET biasing, FET as a voltage variable resistor. The common source and common drain amplifier at high frequencies, MOSFET as a switchs**.**

UNIT V
Feedback amplifier and oscillators: General Feedback Theory, current and voltage feedback, Effect of negative feedback, condition for oscillation, Wein bridge` and RC phase shift oscillator, Hartley and Colpitts oscillator, crystal oscillator, Tunnal diode oscillator.

Text Books:

1. Electronic Devices – Millman & Halkias
2. Electronics Principles – A.P.Malvino

Reference Books:

1**.** Electronic Circuit Discrete and Integrated – Donald I. Schilling
2. Electronic Devices – David Bell

List of Experiment

1. To plot and study forward and reverse characteristics of a P-N junction diode.
2. To study half wave and full wave rectifier.(with and with out filter)
3. To study bridge type rectifier.(with and without filter)
4. To study and plot the input and out put characteristics of transistor in common emitter mode.
5. To plot and study the input &output characteristics of transistor in common base mode.
6. To plot and study the characteristics of FET.
7. To plot and study the characteristics of MOSFET.
8. To study and measure the frequency of a Hartely oscillator.
9. To study and measure the frequency of a Collpitts oscillator.

To study and measure the frequency of a R.C. phase shift oscillator

B.Tech. (Electrical Engineering)
Semester-IV
ELECTRICAL MACHINE-II

UNIT - I

Synchronous Machine I - Constructional features, Armature winding, EMF Equation, Winding coefficients, Equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage regulation using Synchronous Impedance method, MMF method, Potier's Triangle method, Parallel operation of synchronous generators, Operation on infinite bus, Synchronizing power and torque co-efficient. (9)

UNIT - II

Synchronous Machine II - Two reaction theory, Power flow equations of cylindrical and salient pole machines, Operating characteristics.

Synchronous Motor - Starting methods, Effect of varying field current at different loads, Vcurves, Hunting & damping, Synchronous condenser. (8)

UNIT - III

Three phase Induction Machine – I: Constructional features, Rotating magnetic field, Principle of operation, Phasor diagram, Equivalent circuit, Torque and power equations, Torque- slip characteristics, No load & blocked rotor tests, Efficiency, Induction generator & its applications. (9)

UNIT - IV

Three phase Induction Machine- II: Starting, Deep bar and double cage rotors, Cogging & Crawling, Speed control (with and without emf injection in rotor circuit). (8)

UNIT - V

Single phase Induction Motor - Double revolving field theory, Equivalent circuit, No load and blocked rotor tests, Starting methods, Repulsion motor.

AC Commutator Motors - Universal motor, Single phase a.c. series compensated motor, Stepper motors. (8)

Text Books:

1 I.J. Nagrath & D.P.Kothari, " Electrical Machines", Tata McGraw
Hill 2 Husain Ashfaq , " Electrical Machines", Dhanpat Rai & Sons
3 P.S.Bimbhra, "Electrical Machinery", Khanna Publisher
4. A.E. Fitggerald, C.Kingsley Jr and Umans, "Electric Machinery", McGraw Hill, International
Student Edition.

Reference Books:

5 Irving L.Kosow, "Electric Machine and Tranformers", Prentice Hall of India. 6
M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.
7 P.S. Bimbhra, " Generalized Theory of Electrical Machines", Khanna Publishers

LIST OF EXPERIMENT :

Experiment can cover any of the above topics, following is a suggestive list :

1. To perform open circuit test and short circuit test on three phase transformer.(not performed in 3rd sem)
2. (a) To perform load test on 3-phase induction motor.
   (b) Compute Torque, output power, input power, efficiency, input power factor and slip for every load setting.
   (c) Plot the following performance curve:
   (i) Slip Vs Output power.
   (ii) Torque Vs Speed.
3. Perform no load and block rotor test an 3-phase induction motor.
4. To perform no load and block rotor test on single phase induction motor.
5. Study of slip ring induction motor with their speed control.
6. Study of different types of starters in Induction and DC machines.
7. Study of speed control of slip ring induction motor.
8. Study the characteristics of synchronous generator.

B.Tech. (Electrical Engineering)
Semester-IV
PRINCIPLES OF MANAGEMENT

UNIT -I : HISTORICAL DEVELOPMENT

Definition of Management - Science or Art - Management and Administration - Development of Management Thought - Contribution of Taylor and Fayol - Functions of Management - Types of Business Organisation.

UNIT - II : PLANNING

Nature & Purpose - Steps involved in Planning - Objectives - Setting Objectives - Process of Managing by Objectives - Strategies, Policies & Planning Premises- Forecasting - Decision-making.

UNIT - III : ORGANISING

Nature and Purpose - Formal and informal organization - Organization Chart - Structure and Process - Departmentation by difference strategies - Line and Staff authority - Benefits and Limitations - De-Centralization and Delegation of Authority - Staffing - Selection Process - Techniques - HRD - Managerial Effectiveness.

UNIT - IV : DIRECTING

Scope - Human Factors - Creativity and Innovation - Harmonizing Objectives - Leadership - Types of Leadership Motivation - Hierarchy of needs - Motivation theories - Motivational Techniques - Job Enrichment - Communication - Process of Communication - Barriers and Breakdown - Effective Communication - Electronic media in Communication.

UNIT - V : CONTROLLING

System and process of Controlling - Requirements for effective control - The Budget as Control Technique - Information Technology in Controlling - Use of computers in handling the information - Productivity - Problems and Management - Control of Overall Performance - Direct and Preventive Control - Reporting - The Global Environment - Globalization and Liberalization - International Management and Global theory of Management.

TEXT BOOKS

1. Harold Kooritz & Heinz Weihrich "Essentials of Management", Tata McGraw-Hill,1998
2. Joseph L Massie "Essentials of Management", Prentice Hall of India, (Pearson) Fourth Edition, 2003.

REFERENCES

1. Tripathy PC And Reddy PN, " Principles of Management", Tata McGraw-Hill, 1999.
2. Decenzo David, Robbin Stephen A, "Personnel and Human Reasons Management", Prentice Hall of India, 1996
3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.
4. Fraidoon Mazda, "Engineering Management", Addison Wesley,-2000.

B.Tech. (Electrical Engineering)
Semester-IV
ELECTROMAGNETIC THEORY

UNIT I

Cartesian, cylindrical & spherical co-ordinate systems, scalar & vector fields, gradient, divergence & curl of a vector field, Divergence theorem & Stokes's theorem, concept of vectors.

Electrostatic Fields – Coulomb's law, electric field intensity due to different charge distribution viz. line charge, sheet charge, Field due to continuous volume – electric potential, properties of potential function, potential gradient equipotential surfaces, line of force, Gauss law, applications of Gauss law, Gauss law in point form, method of images.

UNIT II

Laplace's & Poisson's equations, solution of Laplace's equation, Electric dipole, dipole moment, potential & electric field intensity due to dipole, Behavior of conductors in an electric field. Conductor & insulator, electric field inside a dielectric, polarization, Boundary value conditions for electric Field, Capacitance & Capacitances of various types of capacitors, Energy stored and energy density in static electric field, Current density, conduction & convection current density ohms law in point form, equation of continuity.

UNIT III

Static Magnetic Field, Biot-Savart's law, Magnetic Field intensity due to straight current carrying filament, circular, square and solenoidal current carrying wire, Relationship between magnetic flux, flux density & magnetic Field intensity; Ampere's circuital law and its applications, magnetic Field intensity due to infinite sheet and various other configurations, Ampere's circuital law in point form, Magnetic force, moving charge in a magnetic field, Lorentz Force on straight and long current carrying conductors in magnetic field, force between two long & parallel current carrying conductors. Magnetic dipole & dipole moment, a differential current loop as dipole, torque on a current carrying loop in magnetic field, Magnetic Boundary conditions.

UNIT IV

Scalar magnetic potential and its limitations, Vector magnetic potential and its properties, vector magnetic potential due to different simple configurations; Self and Mutual inductances, determination of self & mutual inductances, self inductance of solenoid, toroid coils, mutual inductance between a straight long wire & a square loop. Energy stored in magnetic Field & energy density, Faraday's Law, transformer & motional EMFs, Displacement current, Maxwell's equations as Generalization of circuit equations, Maxwell's equation in free space, Maxwell's equation for harmonically varying Field, static and steady fields, Maxwell's equations in differential & integral form.

UNIT V

Electro Magnetic Waves : Uniform plane wave in time domain in free space, Sinusoidally time

varying uniform plane wave in free space, Wave equation and solution for material medium, Uniform plane wave in dielectrics and conductors, Pointing Vector theorem, instantaneous, average and complex poynting vector, power loss in a plane conductor, energy storage, Polarization of waves, Reflection by conductors and dielectric – Normal & Oblique incidence, Reflection at surface of a conducting medium, surface impedance, transmission line analogy.

TEXT BOOK :-

1. S.P. Seth; Electromagnetic Field ;Dhanpat Rai & Sons

REFERENCES:

1. Mathew N.O Sadiku; Elements of Electromagnetic; Oxford.
2. N.N. Rao; Element of Engineering Electromagnetic; PHI.
3. William H. Hayt; Engineering Electromagnetic; TMH.

B.Tech. (Electrical Engineering)
Semester-IV
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

UNIT-I

Measurement and Measuring System: Measurement and its significance, Methods of measurement(Direct and Indirect Method), Standards and their classification, Error in Measurement, Types of Errors, Accuracy and Precision, Resolution, Linearity, Hysteresis, Time Lag, Noise and their types, noise factor.

UNIT-II

Electrical Measurements: Review of indicating andintegrating instruments, voltmeter, ammeter (MC/MI/Dynamo meter), wattmeter (Induction/Dynamo Meter Type), multi-meter and energy meter (Induction Type), P.F. meter (Dynamo meter type), frequency meter (Resonance and Weston type), Weston Synchroscope. Idea of M.D. Meter.

UNIT-III

Measurement of Resistance, Inductance and capacitance: Measurement of low, medium andhigh resistance by wheat stone bridge, Ammeter, voltmeter method, Kelvin's double bridge method. Insulation resistance by megger.

A.C. bridges: Maxwell's bridge, Maxwell's inductance capacitance bridge. Hay's Bridge, Anderson Bridge, Owen's Bridge, Schering Bridge, Desautty Bridge, Heaviside Cambell's Bridge, Wein's Bridge, Sources of error in bridge circuits. Q meter and its application and measurement methods.

UNIT-IV

Instrument Transformers: Introduction, Use of Instrument Transformer, Extension of range using Shunt and Multiplier,Current and potential transformer (Construction and operation),ratio and phase angle errors, rating. Extension of range of instruments and numerical based on it.

UNIT-V

Measurement of Physical quantities: Measurement of Pressure Using Pirani gauge and Thermocouple gauge, Measurement of speed using Stroboscope, Photoelectric and reluctance pick up devices, Measurement of temperature using Resistance Thermometer, Radiation and optical Pyrometer, Measurement of pH value, Measurement of flow using Electromagnetic and ultrasonic flow meter

Text Books:

1. Electrical & Electronics Measurement & Measuring Instruments by A. K. Sawhney Dhanpat Rai & Sons.

B.Tech. (Electrical Engineering)
Semester-IV
POWER TRANSMISSION AND DISTRIBUTION

UNIT-I

Introduction about power system , basic concept of importance of reactive power , Overhead transmission line , transmission line parameter : L , C , R . Calculation of L and C for single phase , three phase , double circuit transmission line , bundled conductor , stranded conductor , GMD ,GMR , effect of earth on capacitance between the conductor , transposition , transmission line communication line interference , radio interference skin effect , skin depth , proximity effect.

UNIT-II

Transmission line modeling ,lumped and distributed transmission line, representation and performance of short , medium , and long transmission line , surge impedance loading , velocity of signal through transmission line , voltage regulation of transmission line and transmission efficiency of short , medium , and long ,rigorous method , nominal π & T network , Ferranti effect, ABCD parameter of short, medium ,and long transmission line. Concepts of HVDC and FACTS.

UNIT-III

Travelling waves or transient in transmission in transmission line , constant of transmission line , incident wave , reflected wave , transmitted wave , relation between coefficients , power flow through transmission line , method of voltage control-receiving end method and sending end method , load frequency control , power factor correction.

UNIT-IV

Overhead Line Insulators : types , string efficiency , voltage distribution in string of suspended insulators , grading ring , method of improving string efficiency.

Mechanical Design of Transmission line : Different types of tower , catenary curve , calculation of sag and tension , sag template , effect of wind and ice loading , vibration dampers , string charts.

Underground cables: Constructional details of various types of cables , oil and gas filled cables , voltage gradient , grading , sheath loss , thermal rating , parameters , corona , factors affecting corona , advantage and disadvantages of corona.

UNIT-V

Distribution System : Primary and secondary distribution systems , concentrated and uniformly distributed loads on distributors fed at one and both ends , ring distribution , voltage drop and power loss calculation , radial feeder , Kelvin law , substation layout , tariff : definition & different tariffs for domestic , commercial , industrial application.

***Text Books* :-**

1 . C.L.Wadhwa , " Electrical Power Systems", New age international Ltd. Third Edition , S.Chand & Co.

2. I.J.Nagrath and D.P. Kothari , " Power System Engineering", Tata McGraw Hill.

3. V.K.Mehta and Rohit Mehta , " Principles Of Power System.

***Reference books* :-**

1 . W.D. Stevenson , " Elements of Power System Analysis" , McGraw Hill.

2 . M.V. Deshpande , " Electrical Power System Design" , Tata McGraw Hill.

LIST OF EXPERIMENTS :

1. To find out the performance of short and medium transmission line by forming simulative network .
2. To study different types of line insulators.
3. To find out voltage distribution and string efficiency by using a simulating network.
4. To study various types of cables and A.C.S.R.
5. To study of current transformer and potential transformer.
6. To find out fusing factor of different types of fuses.
7. Visit to any substation and write a report on it.
8. Visit to any generating station and write a report on it.

B.Tech. (Electrical Engineering)
V Semester
ANALOG AND DIGITAL COMMUNICATION

Unit-I

Introduction to Communication Systems: Block diagram, modulation and demodulation, need for modulation, transmission considerations and decibel ratios.

Amplitude modulation, generation of AM waves, concept of SSB and DSB modulation, vestigial sideband transmission, power-relationships, AM receivers, S/N ratio.

Unit-II

Phase and frequency modulation, pre-and de-emphasis, generation of FM waves, CW modulation systems, narrowband FM, FM detectors and superheterodyne receivers, S/N ratio.

Concepts of information, Shannon-Hartley theorem, bandwidth-S/N ratio tradeoff, coding, codes for error detection and correction, convolution codes, block and trellis codes.

Unit-III

Pulse modulation, PAM, PPM, PWM systems. Concept of PCM, basic coding and quantization, sample and hold, quantization noise, signal to noise ratio, companding, TDM, Delta modulation, adaptive delta modulation, S/N ratio, comparison of PCM, delta and adaptive delta modulation

Unit-IV

ASK, PSK, FSK, differential PSK and quadriphase shift keying, synchronization concepts and phase locked loops. Digital modulation techniques, Generation, Detection, equation and bandwidth of amplitude shift keying(ASK) Binary phase shift keying(BPSK), Differential phase shift keying(DPSK),M-Ary PSK, Binary Frequency shift keying(BFSK), M-Ary FSK Quadrature Amplitude modulation(QAM), MODEM, Introduction to probability of error.

Unit-V

Block diagram of Fibre optic communication systems, light propogation in optical fibres, numerical aperature and acceptance cones of OFs, losses in optical fibres.

Multiplexing in optic Fibre links. An introduction to telephone exchange systems. Telecommunication traffic, circuit switching, message switching and packet switching. Resource sharing and multiple access techniques. An introduction to microwave, radar and satellite communication.

List of Experiments:-

1. Study of sampling process and signal reconstruction and aliasing.
2. Study of PAM PPM and PDM.
3. Time division multiplexing (TDM) and De multiplexing
4. Study of ASK PSK and FSK transmitter and receiver.
5. Study of AM modulation and Demodulation techniques (Transmitter and Receiver) Calculate of parameters.
6. Study of FM modulation and demodulation (Transmitter and Receiver) & Calculation of parameters.
7. Study of PCM transmitter and receiver.
8. Study of AVC and AFC.
9. Study of super hetrodyne receiver and characteristics of ratio radio receiver.

References:

1. Simon Haykins, Communication System. John Willy
2. Wayne Tomasi, Electronic Communication system..

Textbooks:

1.Singh & Sapre, Communication System, TMH
2. B.P. Lathi, Modern Digital and analog communication system.

B.Tech. (Electrical Engineering)
V Semester
ANALOG & DIGITAL ELECTRONICS

Unit-I Analog
Transistor biasing circuits: CE, CC & CB amplifiers, Darlington amplifier. Hparameters and their application in analysis. Class A, B, C, D and S power amplifiers. Pushpull operation. JFET: Biasing and CS, CD and CG amplifier. MOSFET: Depletion type, Enhancement type MOSFET and their biasing.

Unit-II
OP-AMP, Differential amplifier and its DC, AC analysis, OP-AMP characteristics, Non-Inverting/Inverting Voltage and Current feedback. Regulated power supplies; Oscillators and Timer (555)

Unit-III Digital*:*
Logic gates and Logic Families: Logic gates, Universal gates, transistor as a switching element, Combinational Logic gates Introduction to combinational circuits, arithmetic and logical operation, design of Half adder & full adder, subtractor circuits, parity generator & and checker, code converter, decoders, multiplexers, demultiplexers, comparators.

Unit-IV
Sequential Circuits- Flip-flops, bistable circuits: RS, JK, D, T, Master/Slave Flipflop, race around condition, latches, synchronous and asynchronous counters up & down counters, shift registers, state transition diagram

Unit-V
A/D & D/A Converters- D/A converter, accuracy, resolution and precision,
variable resistor network, binary ladder, A/D converter, accuracy and resolution,
simultaneous conversion, counter method, continuous A/D converter, dual slope, successive approximation method.

List of Experiments*:*
1. Study the diode clipping circuits.
2. Study the diode clamping circuits.
3. Study Zener diode as voltage regulator.
4. Study the common emitter configuration of a transistor.
5. Study the common base configuration of a transistor.
6. Study the common collector configuration of a transistor.
7. Study FET as (a) A source follower (b) A voltage variable resistor.
8. Study FET as (a) A chopper (b) A constant current source.
9. Study the following mathematical operations using Op-Amps:- (a) Addition (b) Subtraction (c) Multiplication (d) Division (e) Integration (f) Differentiation
10.Study the Op-Amp as wave form Generator: (a) Astable Multivibrator (b) Triangle Wave Generator (c) Schmitt Trigger

Text/Reference Books:

Analog:

1. Millman and Halkias, “Integrated Electronics”, Mc Graw Hill.
2. R. Boylested and L. Nashelsky, “Electronics Devices and Circuits”, Prentice Hall India.
3. Millman and Halkias, “Electronics Devices and Circuits”, TMH Edition.
4. Malcolm Goodge, “Analog Electronics Analysis and Synthesis”, TMH Edition.
5. Malvino, “Electronics Principles”, TMH Edition.

Digital:

1. RP Jain, „Modern Electronics“.
2. AP Malvino and DP Leach, „Digital Principles and applications“.
3. Floyd, „Digital Circuits“.
4. Charles Roth, „Fundamentals of Logic Design“.
5. H. Taub and D. Schilling, „Digital Integrated Electronics“.
6. Gothman, “Digital Electronics”.

B.Tech. (Electrical Engineering)
V Semester

ELECTRONIC INSTRUMENTATION

Unit-I

Electronic Measurement: Measurements of Current: DC and AC Ammeter, Measurement of Voltage: DC Voltmeter (Chopper type and solid-state), AC voltmeter using Rectifier, Average, RMS, Peak Responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.

Unit-II

Cathode Ray Oscilloscope: Cathode Ray Tube (CRT), Electrostatic focusing, Electrostatic deflection, post deflection acceleration, Graticule, CRO, Different parts of CRO, Vertical & Horizontal deflection system, Time base circuit, Oscilloscope probes, Application of CROs, Lissajous patterns.

Special purpose Oscilloscope: Multi input, Dual trace, Dual beam, Sampling, Storage (Analog & Digital) Oscilloscopes.

Unit-III

Transducers: definition and classification, mechanical devices as primary detectors, Resistive Transducers: Strain Guage, Types of strain Gauge, and gauge factor, Resistance Temperature Detector (RTD), Thermistor, Thermocouple, Inductive Transducer: LVDT, RVDT, Piezo-Electric transducers, Hall Effect transducers, Opto-electronic transducers: photo voltaic, photo diode and photo conductive cells, Photo transistors,

Data Acquisition Systems: Introduction to analog & Digital data acquisition systems, Application of Data Acquisition system.Interfacing transducers to electronic control & measuring systems, Multiplexing, Special encoders. Digital control description

Unit-IV

Signal Generators: Fixed & variable frequency AF oscillators, Sine wave generators, Standard signal generator, AF Sine and Square wave generator Function generator, Square and pulse generator, Random noise generator, Sweep generator, TV Sweep generator, Marker generator, Sweep- Marker generator, Wobblyscope, Video pattern generator Vectroscope, Beat frequency oscillator

Wave analyzer: Basic wave analyzer, Frequency selective wave analyzer, Heterodyne wave analyzer, Harmonic distortion analyzer, spectrum analyzer digital Fourier analyzer.

Unit-V Digital Instruments

Advantages of Digital instruments over analog instruments, resolution and sensitivity of Digital meters,

Digital Voltmeter : Ramp type, Dual slope integration type, Integrating type, Successive approximation type, compression of Electronic & Digital Volt meter, Digital Multimeter, Digital frequency meter, High frequency measurement, Time Period Measurement, Electronic counter, Digital tachometer, Digital PH meter, Digital phase meter, Digital capacitance meter.

Digital display system and indicators: CRT, LED, LCD, 7 segment display, Nixies, Electro luminescent, Incandescent, Electrophoretic image display, Liquid vapour display Dot-Matrix Display.

Recorders: Analog recorders, X-Y recorders.

References:

1.H.S.Kalsi., Electronic Instrumentation, TMH.

2.E.W. Golding, Electrical Measurement and Measuring Instruments Sir Isaac Pitman and Sons, Ltd. London 1940

Textbooks:

1. A.K. Sawhney, Electrical and Electronic measurements and Instrumentation, Dhanpat Rai and Co.

List of Experiments:-

1. Study of Cathode Ray Oscilloscope (C.R.O).
2. Study of Function Generator.
3. Measurement of Displacement using LVDT.
4. Measurement of Strain using Strain Gauge.
5. Measurement of frequency using lissajous pattern
6. Measurement of temperature using RTD.
7. Measurement of temperature using thermocouple.
8. Study of Photo diode and Photo Transistor.

B.Tech. (Electrical Engineering)
V Semester
POWER ELECTRONICS

Unit-I

Advantages and application of power electronic devices characteristics, Symbol & application of power diodes, power transistors, GTO, Triac, Diac, Power MOSFET, IGBT, LASCR, Fast recovery diode, schottey diode MCTs. Principle of operation of SCR, Two transistor analogy, brief idea of construction of SCR, Static characteristics of SCR, Condition of turn on & off of SCR Gate characteristics, Method for turning on of SCR, Turnoff methods, different commutation techniques (Class A,B,C,D,E, & F Commutation) firing of SCR, Use of pubic transformer and opto isolator in firing, Resistance firing Ckt, Resistance capacitance firing circuit, UJT firing cut, and ramp triggering, firing for 3-Φ circuit. SCR rating & protection of SCR over voltage, Over current, Suprior firing, Design of snubber circuit and protection of gate of SCR, heating, cooling & mounting of SCR series and parallel operation of SCR, String efficiency & problem associated with series and parallel operation of SCR

Unit-II

Operation and analysis of single phase (Half wave & Full Wave) and multiphase (Three Phase) uncontrolled and controlled rectifier circuit with resistive, resistive & inductive load (continuous & non continuous conduction, Fw small & very large inductive loads) and RLE loads. Estimation of average load voltage and load current for above rectifier cirucits active and reactive power input. Effect of free wheeling diode and source inductance on performance of these rectifier circuits . Comparison of mid point & Bridge rectifier circuits.

Unit-III

Series and parallel inverter, Voltage source & current source inverter, Single phase and three phase bridge inverter, Self cumulated inverters,, Mc- murray & MC murray bed ford inverters, Voltage control of single phase and three phase bridge inverter, Harmonics & their reduction techniques**.**

Unit-IV

Principle of chopper operation, Various control strategies in chopper, Step up & step-up/step down choppers, chopper configuration (Type A,B, C,D, & E), Steady state analysis of chopper circuits, Current & voltage commutation of chopper circuits Jones & Morgens chopper

Unit-V

Single phase (mid point & bridge configuration) and three phase cyclo convertor configuration and operating principles. AC voltage controllers (using SCRs & Traics) single phase full wave controller with R and RL load, Estimation of RMS load voltage, RMS load current and input

power factor, three phase AC voltage controller (Without analysis) Dual converter Switched mode voltage regulator buck, Boost, Buch & Boost, Ck regulators.

List of Experiments:

1. Study the performance of single-phase half-wave and full-wave uncontrolled rectifiers.
2. Study different firing circuits of SCR.
3. Study forced commutation circuits of SCR.
4. Study protection circuits of SCR: (i) dv/dt (ii) di/dt (iii) Over voltage (iv) Over current .
5. Study the characteristics of a Thyristor and a Triac.
6. Study firing circuit of SCR using ramp-comparator scheme.
7. Study firing circuit of SCR using cosine-wave scheme.
8. Study firing circuit of SCR using Op-amps and Gates.
9. Study digital firing circuit of SCR.
10. Study operation of Triac in all four modes and study AC phase control using Triac.

References:

1. Power electrics : Circuits, devices & applications,
   M. H. Rashid, PHI
2. Power Electronics, P.C. Jain, TMH

Textbooks:

1. P.C. Sen, Power Electonics, TMH
2. Dr. P.S. Bhimbhra, Power Electonics, Khanna Pub.

B.Tech. (Electrical Engineering)
V Semester
SWITCHGEAR AND PROTECTION

Unit-I

Switchgear- Introduction, functions of a circuit breaker, contacts separation and arc phenomenon, theory of arc formation and its extinction, recovery voltage, restriking voltage, interruption of capacitive and inductive currents, resistance switching, double frequency transients, circuit breaker ratings, clearing time, reclosing time, classification of circuit breakers, oil, air-blast, vacuum and SF6 circuit breakers.

Unit-II

Protection Against Lightning- Lightning mechanism and its characteristics, over- voltages due to lightning, protection of lines and sub-stations against lightning using shield wires, tower footing resistance, counterpoises, ground wires, rod gaps, lightning arrestors, their construction, working and ratings, surge absorbers and surge divertors.

Unit-III

Insulation Co-ordination: Impulse volt-time characteristics of electrical apparatus, basic impulse insulation level, insulation levels of sub-station equipments

Unit-IV

Protective Relays: Introduction, basic requirements, operating principles and characteristics of electromagnetic type over-current, differential, impedance and admittance relays. Detail of protection against abnormal conditions for alternators, transformers, feeders transmission lines, and bus-bars. Carrier current protection for long lines.

Unit-V

Static Relays: Introduction, comparison with electromagnetic relays, working of instantaneous, definite time, inverse time and directional over current relays, introduction to digital relays.

List of Experiments:

Operating Characteristics of

1. Over Voltage Relays
2. IDMT Relays
3. Percentage based differential relays
4. Buchholz relays .
5. Solid state over current relays

References:

1. Sunil S. Rao , Switchgear and protection.
2. Badriram & Vishwakarma, Power System Protection

Textbooks:

1. IJ Nagrath and DP Kothari,"Power System Engineering" Tata McGraw-Hill.
2. CL Wadhwa, "Electric Power Systems", Wiley Eastern Limited.

B.Tech (Electrical Engg.)
Semester-VI
ELECTRICAL DRIVES

UNIT-I

Introduction- Classifications of Electric Drives, components of electric drives, advantages of electric drives, Review of characteristics and speed control of d.c. and a.c. motors. Dynamics of Electric Drives:- Fundamental torque equation, speed-torque conventions and multiquadrant operation, equivalent values of drive parameters, components of load torques, nature and classification of load torques, calculation of time and energy-loss in transient operations, criteria for steady state stability, load equalization.

UNIT-II

Rating and Heating of Motors- Thermal model of motor for heating and cooling, classes of motor duty, determination of motor rating, frequency of operation of motors subjected to intermittent loads.

UNIT-III

Rectifier Control of D.C. Drives- Controlled rectifier circuits, 1-phase fully controlled rectifier-fed separately excited d.c. motor, 3-phase fully controlled rectifier-fed separately excited d.c. motor, multi quadrant operation of fully-controlled rectifier-fed d.c. motor. Chopper Control of D.C. Drives- Principle of operation and control techniques, motoring operation of separately excited and series excited motors, multi quadrant control of chopper-fed motors.

UNIT-IV

Induction Motor (IM) Drives:- 3-phase a.c. voltage controller-fed IM drive, voltage source inverter (VSI) and current source inverter (CSI) variable frequency drives, comparison of VSI and CSI drives, cyclo-converter-fed IM drive, static rotor resistance control of 3-phase slipring IM.

UNIT-V

Synchronous Motor Drives- VSI drive, CSI drive, CSI drive with load commutation, cyclo-converter drive, Braking methods- Various methods of braking d.c. and a.c. motors, regenerative braking of d.c. motors during chopper control, static scherbius drive, commutatorless Kramer drive. Introduction to Microprocessor Control of Electric Drives.

Reference Books:

1. V. Subrahmanyam, " Electric Drives: Concepts and Applications", Tata Mc Graw Hill Publishing. 2. G.K. Dubey, " Power Semiconductor Controlled Drives, "Prentice Hall, Englewood cliff.

Text Book:

1.G.K. Dubey, “Fundamentals of Electrical Drives” Narosa Publishing House.
2. P. C. Sen, “Thyristor dc Drives”, Wiley International.

List of Experiments (Using MAT LAB):

1. Study speed control of separately excited dc motor by varying armature voltage using single-phase fully controlled bridge converter.
2. Study speed control of separately excited dc motor by varying armature voltage using single phase half controlled bridge converter.
3. Study speed control of separately excited dc motor using single phase dual converter (Static Ward- Leonard Control)
4. Study speed control of separately excited dc motor using MOSFET/IGBT chopper
5. Study closed loop control of separately excited dc motor
6. Study speed control of single phase induction motor using single phaseac voltage controller.
7. Study speed control of three phase induction motor using three phase ac voltage controller.
8. Study speed control of three phase induction motor using three phase current source inverter
9. Study speed control of three phase induction motor using three phase voltage source inverter.
10. Study speed control of three phase slip ring induction motor using static rotor resistance control using rectifier and chopper

B.Tech (Electrical Engg.)
Semester-VI
ELECTRICAL MACHINE DESIGN

UNIT-I
Introduction: Review of Magnetic and insulating materials. Review of Magnetic and Electrical Quantities, Force and Torque Determination (Mathematical Analysis), Factors and limitations in design, specific magnetic and electric loadings, Real and apparent flux densities.
Heating, Cooling and Ventilation.

UNIT-II
Design of Transformers: General considerations, output equation, main dimensions, leakage reactance, winding design, tank and cooling tubes, calculation of magnetizing current, losses, efficiency and regulation.

UNIT-III
Design of DC Machines: Output Equations, Main Dimensions, Magnetic Circuit Calculation, Carter's Coefficient, Net length of Iron, Selection of No.of Poles, Design of Armature, Design of Commutater and Brush.

UNIT-IV
Design Three-phase induction motors: General considerations, output equation, choice of specific electric and magnetic loadings, No. of slots in stator and rotor, elimination of harmonic torques, design of stator and rotor windings, leakage reactance, equivalent resistance of squirrel cage rotor, magnetizing current, temperature rise and efficiency.

UNIT-V
Design of Alternators: Classification and their comparison, specific loadings, output coefficient, main dimensions, short circuit ratio, elimination of harmonics in generated EMF, stator winding design. Introduction to computer aided electrical machine design.

Reference Books:
1. Clayton A.E., "The performance and design of D.C. Machines".
2. Say MG, "The performance and design of A.C. Machines".

Text Book:
1. Sawhney AK, "Electrical Machine Design", Dhanpat Rai & Sons.

B.Tech (Electrical Engg.)
Semester-VI
CONTROL SYSTEM

UNIT-I

Control Systems: Concept, terminology and classification of Control Systems. Laplace transform and their properties, Inverse Laplace transform, Block diagram and its reduction, Signal flow graph, Manson's Gain Formula, Mathematical Models of Systems- Differential equations of physical systems, transfer function of linear systems, D.C. & A.C. Servomotors, Synchros.

UNIT-II

Feedback Control System Characteristics: Transient and Steady state response, Time domain analysis of first order, second order and higher order control systems.

Steady state error: concept and estimation for first and second order control system, Static positional error coefficient, Static velocity error coefficient, Static acceleration error coefficient.

Sensitivity: Concept of sensitivity, Analysis of sensitivity of open loop and close loop control system, Performance indices.

UNIT-III

Stability: Concept of stability, Characterstic of stable, unstable and marginally stable system, Stability criterion: Routh-Hurwitz stability criterion, Nyquist criterion, Bode plot, gain margin and phase margin, Root locus and Lyapunov's criterion,

UNIT-IV

Design of Feedback Control System: Approaches to system design, Compensation: phase lead compensation, phase lag compensation, phase lead-lag compensation, design of compensator using Bode plot and root locus techniques.

Control action: concept and types, Proportional control, Derivative control, Integrative control, PID control, Feedback Control and ON-OFF Control action.

UNIT-V

State Space Representation: State Variable Model, State variables of a dynamic system, state equation, transfer function from the state equation and vice-versa, design using State variable Technique,Transfer function decomposition, Controllability, observability, pole placement using state feedback, Ackerman's formula, limitations of state variable feedback.

Reference Books:

1. I.J.Nagrath and M.Gopal, "Control System Engg", TMH.
2. M.Gopal, "Control Systems Principles and Design", TMH.

Text Book:

1. K. Ogata, "Modern Control Engineering", PHI.

1. Study time response of second order system.
2. To study characteristics of Synchros.
3. To study effect of feedback on servomotors.
4. Determination of transfer function of A-C servomotor
5. Determination of transfer function of D-C servomotor.
6. Formulation of PI & PD controller and study of closed loop responses of 1st and 2nd order dynamic systems.

B.Tech (Electrical Engg.)
Semester-VI
MICROPROCESSOR AND MICROCONTROLLER

UNIT-I

Microprocessor Architecture-8085 microprocessor architecture, timing and control unit, machine cycles, interrupt diagram. Architecture of 8086 microprocessor

UNIT-II

Programming- Addressing modes, instruction set, assembly language programming, program for multi byte addition/subtraction, multiplication, division, block transfer.

UNIT-III

Interfacing- Basic principles of interfacing memory and I /O devices. Data transfer techniques – programmed interrupt and DMA. Details of interfacing devices 8255 and 8253. Interfacing of D/A and A/D converter.

UNIT-IV

Semi Conductor Memory- Read only memories, random access memories. Interfacing of memories with 8085/86.

UNIT-V

Microcontroller- Architecture of 8051 microcontroller. Interrupt, serial and timer control. Instruction set and programming. Interfacing with D/A and A/D converter. Applications of microprocessors and microcontrollers.

Reference Books:

1. R.S. Gaonkar, "Microprocessor Architecture, Programming and Applications.
2. K.J. Ayala, "8051 Microcontroller", Penram International.

Text Book:

1.Ray A.K., Bhurchandi K.M. "Advance Microprocessor and peripheral", first edition, TMH.

List of Experiment:

1.Familiarization with 8085/86 Microprocessor and 8051 Microcontroller kit.
2.Write program for display of 24 hour clock on 8085 mp kit.
3.To generate square wave, saw tooth, triangular wave of 1KHz frequency and 50% duty cycle using 8051 kit.
4.To develop and run a program for arranging in ascending/descending order of a set of numbers
5.To obtain interfacing of keyboard and DMA controller
6.To perform microprocessor based traffic light control operation through 8085 kit

B.Tech (Electrical Engg.)
Semester-VI
SIGNAL AND SYSTEM

UNIT-I

Dynamic Representation of Systems: Systems Attributes, Causality linearity, Stability, time invariance.Special Signals, Complex exponentials, Singularity functions (impulse and step functions).. Linear Time-Invariant Systems: Differential equation representation convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).

UNIT-II

Fourier Analysis of Continuous Time Signals and Systems : Fourier Series, Fourier Transform and properties, Parseval's theorem, Frequency response of LTI systems. Sampling Theorem.

UNIT-III

Fourier Analysis of Discrete Time Signals & Systems : Discrete-Time Fourier series, Discrete-Time Fourier Transform (including DFT) and properties. Frequency response of discrete time LTI systems.

UNIT-IV

Laplace Transform: Laplace Transform and its inverse: Definition, existence conditions, Region of Convergence and properties, Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros.

UNIT-V

Z-Transform : Z-Transform and its inverse: Definition, existence, Region of convergence and properties, Application of Z-Transform for the analysis of Discrete time LTI Systems, Significance of poles and zeros.

Reference Books:

1.Simon Haykin, Communication Systems, 3rd Edition, John Wiley.
2. Alan V. Oppenheim, Alan S. Willsky and H. Nawab, Signals and Systems, Prentice Hall.

B.Tech (Electrical Engg.)
Semester-VII
ENERGY CONSERVATION AND MANAGEMENT

UNIT-I
Energy Review of various energy sources, Need of energy conservation and energy audit.

UNIT-II
Energy Conservation: Lighting energy: methods/Techniques of efficient lighting, Heating: methods/Techniques of energy Saving in Furnaces, Ovens and Boilers, Cooling: Methods/Techniques of Energy Saving in Ventilating systems and Air Conditioners Motive power, Energy Efficient Motors, and Efficient use of energy in motors with the help of voltage reducers, automatic star/ delta converters. Power factor improvement devices and soft starters/Variable Frequency Drives, Amorphous Core Transformers Cogeneration –Types and Advantages.

UNIT-III
Tariff and Energy Conservation in Industries: Energy cost and Recent MSEB tariffs, Application of Tariff System to reduce Energy bill, Energy Conservation by improving load factor and power factor**.**
Energy Conservation in Transmission and Distribution Systems: Reactive power compensation, demand side management, system voltage optimization and phase current balancing, Losses in transmission and distribution system and its minimization

UNIT-IV
Energy and the Environment: Environment and social concerns related to energy utilization, The greenhouse effect, Global Warming and its effect , Pollution, Acid Rains, Global Energy and environment Management.

UNIT-V
Energy Audit: Procedure of Energy audit, ABC analysis, Energy Flow Diagram and its importance, Measurements in energy audit and various measuring instruments, Questionnaires for the energy audit, internal energy audit checklist, Equipment used for energy conservation, Calculation of payback period for energy conservation equipment. IE rules and regulations for energy audit, Electricity act 2003.

REFERENCE BOOKS:
1. C.L. Wadhawa Generation Distribution and Utilization of Electrical Energy New Age 2004.
2. Electrical Energy Utilization & Conservation. Dr. Tripathi S.Chand.

TEXT BOOKS:
1. Energy Management – W.R. Murphy & G. Mckey Butler worths.
2. Energy Management Head Book- W.C. Turner, John Wiley.

LIST OF EXPERIMENT:

1. Study of various energy efficient lighting systems and its comparison.
2. Measurement of strength of light signal using lux meter.
3. Study of energy efficient motors.
4. Study of energy efficient transformer.
5. Study of energy conservation act 2001.
6. Study of BEE star rating of electrical appliances.
7. Study of digital voltmeter.
8. Study of digital ammeter.
9. Study of digital wattmeter.
10. Study of digital energy meter.
11. Study of digital frequency meter.
12. Study of power factor meter.
13. Preparation of energy audit report for any electrical lab.
14. Preparation of energy audit report for household appliances.
15. Preparation of energy audit report for any industry.

B.Tech (Electrical Engg.)
Semester-VII
POWER SYSTEM ANALYSIS AND CONTROL

UNIT-I
Representation of Power System Components- Synchronous machines, Transformers, Transmission lines, one line diagram, Impedance and reactance diagram, per unit System.

UNIT-II
Symmetrical components- Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.
Symmetrical fault analysis- Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions.

UNIT-III
Unsymmetrical faults -Analysis of single line to ground fault, line-to-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance. Formation of Z bus using singular transformation and algorithm, computer method for short circuit calculations.

UNIT-IV
Load Flow- Introduction, bus classifications, nodal admittance matrix (Y BUS), development of load flow equations, load flow solution using Gauss Siedel and Newton Raphson method, approximation to N-R method, line flow equations and fast decoupled method.

UNIT-V
Power System Stability- Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by- step method. Factors affecting steady state and transient stability and methods of improvement.

Power Control- Concept of Load frequency control, Concept of voltage and reactive power control.

Reference Books:
1. W.D. Stevenson, Jr. "Elements of Power System Analysis", McGraw Hill.
2. C.L. Wadhwa, "Electrical Power System", New Age International.
Text Books:
1.Kothari & Nagrath, "Modern Power System Analysis" Tata McGraw Hill.
2. L. P. Singh; "Advanced Power System Analysis & Dynamics", New Age International.
List of Experiments:
1. To determine direct and sub transient axis reactance (x_d) and quadrature axis reactance (x_q) of a salient pole alternator.
2. To determine negative and zero sequence reactance of an alternator.
3. To determine fault current for L-G, L-L, L-L-G and L-L-L faults at the terminals of an alternator at very low excitation.

4. To study the IDMT over current relay and determine the time current characteristics.
5. To study percentage differential relay, Impedance, MHO and Reactance type distance relays.
6.To study Ferranti effect and voltage distribution in H.V. long transmission line using transmission line model.
7. To obtain formation of Y-bus and perform load flow analysis using Gauss-Siedel method.
8. To perform symmetrical and unsymmetrical fault analysis in a power system.

B.Tech (Electrical Engg.)
Semester-VII
UTILIZATION OF ELECTRICAL POWER

UNIT-I

Illumination- Nature of light, important definitions, laws of illumination, principle of production of light- discharge through gases under pressure – incandescence/sources of light-filament lamp, halogen lamp-discharge lamp-sodium discharge lamp,high pressure mercury discharge lamp, dual lamps, fluorescent lamps, lamp efficiency,requirements of good lighting, illumination level, absence of contrasts, shadows, glare, colour rendering-lamp fittings. Lighting schemes,design of indoor & outdoor lighting system-street lighting,flood lighting, photometers.

UNIT-II

Electric Heating- Advantages of electric heating, classification of heating methods, detailed study of resistance heating, arc heating, electron bombardment heating, induction heating & dielectric heating and their control.

UNIT-III

Electrolytic Processes- Fundamentals of electro deposition-laws of electrolysis applications of electrolysis, electro deposition, manufacture of chemicals, anodizing, electro- polishing, electro-cleaning, electro-parting, electrometallurgy, electric supply.

UNIT-IV

Train Mechanics- Types of services, characteristics of each type of service, speed time curve, simplified speed time curve, average speed, schedule speed, factors affecting schedule speed, tractive effort for propelling a train, power of the traction motor, specific energy output, specific energy consumption, factors affecting specific energy consumption, mechanics of train movement, coefficient of adhesion, factors affecting slip.

UNIT-V

Electric Traction- D.C. & A.C. traction motors, their characteristics Traction Motor Control: Starting and speed control of D.C. series motors, shunt transition, bridge transition, drum controller employing shunt transition, energy saving with series parallel starting, metadyne control, multiple unit control, braking of traction motor.Current Collection Systems- Conductor rail equipment, current collection gear for OHE: Cable collector, pole collector, bow collector, pantograph collector.

Reference Books:

1. H. Partap, “Art & Science of Utilization of Electrical Energy”.
2. N.V. Suryanarayana, “Utilization of Electric Power”.

Text Books:

1. BR Sharma, “Utilization of Electrical. Energy”.
2. P.V. Gupta, “A Course in Electrical Power”, Dhanpat Rai & Sons Delhi.

B.Tech (Electrical Engg.)
Semester-VII
MAJOR PROJECT (PLANNING AND LITERATURE SURVEY)

The object of Project Work I is to enable the student to take up investigative study in the broad field of Electrical Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the students in R&D work. The assignment to normally include: Survey and study of published literature on the assigned topic; Working out a preliminary Approach to the Problem relating to the assigned topic; Conducting preliminary Analysis/ Modelling/ Simulation/ Experiment/ Design/ Feasibility; Preparing a Written Report on the Study conducted for presentation to the Department; Final Seminar, as oral Presentation before a Departmental Committee.

B.Tech (Electrical Engg.)
Semester-VIII
MAJOR PROJECT

The object of Project Work is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the students in R&D work and technical leadership. The assignment to normally include: In depth study of the topic assigned in the light of the Report prepared ; Review and finalization of the Approach to the Problem relating to the assigned topic; Preparing an Action Plan for conducting the investigation, including team work; Detailed Analysis/ Modelling/ Simulation/ Design/ Problem Solving/ Experiment as needed; Final development of product/process, testing, results, conclusions and future directions; Preparing a paper for Conference presentation/Publication in Journals, if possible; Preparing a Dissertation in the standard format for being evaluated by the Department; Final Seminar Presentation before a Departmental Committee.

ective Subject

Knowledge Entrepreneurship

Unit – I
Introduction: Entrepreneurship in Knowledge economy, abundant & accessible information, implication, impact & consequence, knowledge based opportunities, aims, scope, and objectives.

Unit-II
Managing knowledge & intellectual capital:
Knowledge management, loss of knowledge, knowledge implementation, knowledge creation, property intellectual capital.

Unit-III
Contemporary information problems:
Information overload, winning & losing barrier to entry, emerging issues, customers, investors, myth of inevitable program.

Unit-IV
Creating enterprise cultures:
Working with employer, organizing for entrepreneurship, unity & diversity, ten essential freedoms, freedom of operation, effective issue monitoring, establish search criteria.

Unit-V
Becoming a knowledge entrepreneur:
Entrepreneur qualities, knowledge entrepreneur, challenge of launching new product, creating launch support tool, examples of best practice.

Text & Reference Books
Amrit Tiwana ,The Knowledge Management tool kit, Pearson Education.
Lunlin Conlson, Knowledge Entrepreneur, Thomas Press.
Catheriue L Mann, Knowledge entrepreneurship, Oxford
Heinke Robkern ,Knowledge entrepreneurship,.
Bonnie Montano,Knowledge Management, , IRM Press, Londan

Subject: Electrical Estimation and costing

ourse Objectives:

1. To give exposure to basic concepts estimating and costing.
2. To impart knowledge about material requirements for various Electrical installations.
3. To provide guidelines for preparation of Electrical drawings for residential and commercial buildings, ,

distribution substation, grid substation, overhead Lines

Course Outcomes:

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

1. Explain general principles of estimation & residential building electrification
2. Preparation of detailed estimates and costing of residential and commercial installation.
3. Design and estimate of overhead transmission & distribution lines, Substations.

UNIT I: Principles of Estimation and Residential Building Electrification

Introduction to estimation and costing, Electrical Schedule. Determination of cost material and labor Contingencies. Overhead charges. General Rules guidelines for wiring of residential installation and positioning of equipments**,** Principles of circuit design in lighting and power circuits. Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram. Selection of type of wiring and rating of wires and cables Load calculations and selection of size of conductor, Selection of rating of main switch Distribution board, protective switchgear and wiring accessories, Preparation of detailed estimates and costing of residential installation.

UNIT II: Electrification of Commercial Installation

Design considerations of electrical installation system for commercial building, Load calculation and selection of size of service connection and nature of supply, Deciding the size of the cables, bus bar and bus bar chambers, Mounting arrangements and positioning of switchboards, distribution boards main switch etc, Earthing of the electrical installation, Selection of type wire, wiring system and layout, Preparation of detailed estimate and costing of commercial installation.

UNIT III: Service Connection, Power Circuits, Inspection and Testing of Installation

Concept of service connection, Types of service connection and their features, Method of installation of service connection, Estimates of underground and overhead service connections, Inspection of internal wiring installations, Inspection of new installations, testing of installations, testing of wiring installations, Important considerations regarding motor installation wiring, Determination of rating of cables Determination of rating of fuse, Determination of size of Conduit, distribution Board main switch and starter.

UNIT IV: Design of Overhead Transmission and Distribution Lines

33KV, 11 KV, LT, Under ground

UNIT V: Design and Estimation of Substation

Introduction, Classification of substation, Indoor substations, Outdoor substations,Pole mounted/plinth, Selection and location of site for substation, Main Electrical Connections, Graphical symbols for various types of apparatus and circuit elements on substation main connection diagram. Key diagram of typical substations. Equipment for substation and switchgear installations, Substation auxiliaries supply, Substation Earthing.

Note : For estimation and costing calculations refer attached sheets