

SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)



SYLLABUS

For
DIPLOMA IN ENGINEERING (3 YEAR)
ELECTRICAL ENGINEERING
Course Code : DEE

Department of Electrical & Electronics Engineering
Faculty of Engineering

Duration of Course : 3 Year
Examination Mode : Semester
Examination System : Grading

Swami Vivekanand University, Sironja Sagar (M.P.)
2016-2017



DEE 0301 BASIC ELECTRICAL ENGINEERING AND MATERIALS

UNIT-I

D.C. Circuits

Concept of charge, current, voltage, EMF, resistance, resistivity. Ohm's law, KCL, KVL. Series and parallel combination of resistances, star-delta connection, star to delta and delta to star transformation.

UNIT-II

A.C. Fundamentals -

Concept of inductance, capacitance, reactance, impedance, admittance, phasor diagram of pure resistive, inductive and capacitive circuit. Difference between AC and DC quantities, sinusoidal waveform, frequency, time period. Instantaneous, maximum, average and RMS value, form factor.

UNIT-III

Magnetic effect of electric current - Concept of lines of force, flux, MMF, reluctance, permeability, magnetic flux density, magnetic field intensity. Analogy of electric and magnetic circuit, units. Faraday's laws of electromagnetic induction, self and mutual induction. Lenz's laws, Fleming's left and right hand rule.

UNIT-IV

Heating effect of electric current - Heat produced. Work, power and energy, units. Chemical effect of electric current Faradays laws of electrolysis. Primary and secondary cells.

UNIT-V

Electrical Engineering materials - Definition of conductors, insulators and semiconductors. Intrinsic and extrinsic semi conductor materials. Properties and applications of conducting, semi-conducting and insulating materials, classification of insulating materials on the basis of temperature. B-H curve, soft and hard Magnetic materials Different magnetic materials, properties and applications.

LIST OF EXPERIMENT

1. Study of different types of meters/indicators, Ammeter, voltmeter, wattmeter etc.
2. Measurement of current and voltage in single phase and three phase circuit series and parallel circuit.
3. Measurement of current, voltage and power in single phase circuit.
4. Study of different types of loads i.e. resistive, inductive and capacitive load.
5. Study of multimeter. Verification of ohms law.
6. Study of different types of conducting, insulating, and magnetic materials.
7. Study of different types of primary and secondary cells and batteries.

REFERENCES

1. Basic Electrical Engineering By Nagrath Kathari
2. Electrical Engineering Materials By TTTI Madras.
3. Basic Electrical Engineering By Jain & Jain
4. Basic Electrical Engineering By V.K. Mehta
5. प्रारंभिक वैद्युत अभियांत्रिकी By एम.एफ.कुरैशी, दीपक प्रकाशन



DEE 0302 ELECTRICAL CIRCUITS

UNIT 1

CIRCUIT ANALYSIS

Active and passive elements, ideal current source and voltage source. Unilateral and bilateral elements. Number of loops, nodes, branches of a network. Analysis of networks by "Mesh" and "Node" methods. T and π terminal networks, input and output impedance and admittance.

UNIT 2

NETWORK THEOREMS

Maxwell's loop theorem, Nodal analysis, Superposition, Thevenin's, Nortons' and maximum power theorems with numerical problems.

UNIT 3

SINGLE PHASE A.C. CIRCUITS

Representation of A.C. quantity by phasor methods, rectangular and polar co-ordinates. RLC series and parallel combinations. Impedance, power in single phase circuits. Concept of power factor, conductance, admittance and susceptance. Series and parallel circuits, resonance in series circuit.

UNIT 4.

POLYPHASE CIRCUITS

Concept of poly phase A.C. circuits, advantages over single phase. Generation of three phase voltage system. Three phase circuits, phase sequence, vector and wave diagrams. Star and delta connections, phase and line values of current and voltage, power in three phase circuits. Balanced and unbalanced systems

UNIT 5.

TRANSIENTS

Concept of transient, variation of current when connected to D.C. or A.C. series circuit (R.L. combination and R.C. combination). Time constant.

LIST OF EXPERIMENTS

- 1 Verification of Superposition theorem
- 2 Verification of Norton's and Thevenin's theorem
- 3 Verification of Maximum power transfer theorem
- 4 Performance of R-L-C- series circuit
- 5 Performance of R-L-C- parallel circuit
- 6 Study of electrical resonance in series circuit
- 7 Verification of relation between line and phase voltage and current in 3-phase circuit
- 8 Study of transients



DEE 0303 ELECTRICAL MACHINES-I

UNIT 1.

Energy Conversion Principle - Law of conservation of energy, electromechanical energy conversion classification of machines.

UNIT 2.

D. C. Generator - Principle, construction, armature winding, types of winding, EMF equation, armature reaction and commutation, interpoles and compensating winding. Types of generators, characteristics and applications, losses and efficiency. Simple numericals.

UNIT 3.

D. C. Motors - Principle, production of back EMF, torque equation. Classification, characteristics of D. C. motors, starters, speed control, losses and efficiency, applications of motors. Brake test, Swinburn test. Simple numericals.

UNIT 4.

Single phase transformers - Principle, construction, classification. EMF equation, turns ratio, name plate rating, phasor diagram, no load and on load equivalent circuit. Voltage regulation, polarity ratio, open and short circuit tests, losses and efficiency, condition of maximum efficiency. All day efficiency and its numerical. Auto transformer. Parallel operation of single phase transformer.

UNIT 5.

Three phase transformer - Connections, groups, Scott and open delta connection. Comparison of three phase transformer with bank of three single phase transformers. Parallel operation.

LIST OF EXPERIMENTS

- 1 Study of D. C. Machines (Parts)
- 2 Speed control of D. C. Motor (armature and field control method)
- 3 To perform Swinburn test of DC Motor.
- 4 Study of transformer (Parts) (single and three phase)
- 5 To perform polarity test of single phase transformer.
- 6 To perform ratio test of single phase transformer.
- 7 To perform open circuit test of single phase transformer.
- 8 To perform short circuit test of single phase transformer.
- 9 Parallel operation of single phase transformer.

REFERENCES

1. Electrical Technology Vol. II by B. L. Thareja Khanna Publisher
2. Electrical Machines by Bhattacharya, T.T.T.I.
3. Electrical Machines by Nagrath & Kothari, PHI Publication
4. Electrical Machines Vol. I & II by P.S. Bhimbra, Khanna publishers
5. विद्युत मशीनें एम.के.डियोडिया हिन्दी ग्रंथ अकादमी



DEE 0304 ELECTRICAL AND ELECTRONICS MEASUREMENTS AND MEASURING INSTRUMENTS

UNIT 1

Classification of measuring instruments, Indicating, recording and integrating types of meters. Errors and types of errors, accuracy, precision and sensitivity, Electrical measuring instruments - Construction, operation Deflecting, controlling and damping forces, supporting systems, moving coil, electro-dynamometer, moving iron and induction type instruments, simple numerical. Hot wire type instruments, vibration galvanometer, shunt and multipliers, CT & PT.

UNIT 2

Wattmeter and Energy meters –

Dynamometer and induction type wattmeter, Induction type energy meters. measurement of 1-phase and 3-phase power in balanced and unbalanced load condition, 3 phase wattmeter.

UNIT 3

Measurement of resistance –

Classification of resistance, measurement of low, medium, and high resistance. Kelvin's double bridge, wheat-stone bridge, Ammeter, voltmeter method and ohmmeter, multimeter, megger. Importance of earth resistance, Earth tester.

A. C. Bridges –

Measurement of inductance and capacitance by A.C. bridges. Maxwell, Anderson, Hays, Desauty and Wien's bridge. (no phasor diagram)

UNIT 4

Additional measuring instruments –

Electrical resonance, Weston and vibration reed frequency meter, dynamometer power factor meter, Weston synchroscope, Merz price maximum demand meter, Rotating type phase sequence indicator.

Magnetic measurement –

Balastic galvanometer, measurement of flux by B.G. Gressort flux meter, determination of hysteresis loop for ring and bar specimen. Dielectric measurement. Meaning of dielectric loss, its importance, methods of measurement of dielectric loss by Wattmeter, C.R.O. Schering bridge.

UNIT 5

Cathode Ray Oscilloscope –

CRT, Electrostatic and magnetic deflection, time base X and Y amplifiers, controls on the C.R.O. Dual beam oscilloscope. Digital storage and multi-channel CRO .

Electronic Instruments -

Transistor volt meter, FETVM, balanced bridge, specification of electronic voltmeter. Single and three phase electronic energy meters, mili-voltmeter and micro-volt meters.



LIST OF EXPERIMENTS

- 1 Measurement of low resistance by Kelvinn Double bridge.
- 2 Measurement of medium resistance by wheat stone bridge.
- 3 Measurement of insulation resistance by Megger.
- 4 Measurement of inductance by Maxwell's bridge.
- 5 Calibration of Voltmeter, Ammeter, Wattmeter, Energy meter.
- 6 Measurement of P.F. by ammeter, voltmeter and wattmeter method.
- 7 Plot B.H. curve by method of reversal using B.G.
- 8 Use of CRO for measurement of voltage, current, phase and frequency etc.
- 9 Measurement of 3-phase power by two wattmeter method.
- 10 Study and use of digital instruments, e.g. digital multi meter, frequency meter, electronic timers and counters.
- 11 Study and use of various electrical instruments e.g. phase sequence meter, wave meter. M.D. meter, tong tester.
- 12 Study and use of C.T. & P.T. for extension of instrument range.
- 13 Use of multi meter in a circuit for measurement of voltage, current and resistance.



DEE 0305 BASIC ELECTRONICS

UNIT 1

Semiconductor Devices –

(a) Concept of electronic emission – Different methods of electronic emission and their applications.

(b) Diodes - Formation of PN junction, forward biasing and reverse biasing of PN junction, construction, characteristics and application of different types of diodes, Zener diode .

(c) Transistor -PNP/ NPN Junction Transistors, different configurations: CB, CE, CC. Transistors Characteristics, and applications.

(d) Special Semiconductor devices – Construction, symbol and application of Tunnel diode, photo diode, varactor, FET, MOSFET, UJT.

UNIT 2

Rectifiers –

Single phase, half wave, full wave and bridge types of rectifiers. calculation of output voltage, average and RMS values, ripple factor and rectification efficiency. Filter, and types of filters. Regulated Power Supply - Difference between linear and switch mode power supply, regulated power supply and its limitations, series and shunt power supply using transistors, SMPS (Block diagram only), IC regulated power supply (78XX and 79XX series).

UNIT 3

Amplifiers - Principal of amplification, types of transistor amplifiers, biasing techniques, RC coupled, transformer coupled, and direct coupled amplifiers, push pull Amplifier, advantages and disadvantages, detailed study of circuit diagram, working principal and applications of above amplifiers, use of operational amplifier as comparator, multiplier, summer, integrator and differentiator.

Oscillators – Principal of oscillation, Types of oscillators such as Hartley, Colpitts, tuned oscillator, Weign bridge oscillator: circuit diagram, principal, working & applications. Non sinusoidal Generator Astable, monostable and bistable multivariate circuits, principal of working and output waveforms.

UNIT 4

.Modulation and Demodulation – Amplitude, phase and frequency modulation, principle, methods and applications of above modulations, A.M. and F.M. detection

UNIT 5

Integrated circuits - Concepts of IC's classification, types and their advantages, applications of common IC's such as 741, 555, 810 and digital IC's. Digital Techniques - Number system, binary, decimal number system. Addition, subtraction, multiplication & division of binary numbers. Logic gates- their symbols, truth table and applications.



LIST OF EXPERIMENTS

- 1 Study of C.R.O. & multimeter
- 2 Study of electrical and electronic components
- 3 Colour coding of Resistors
- 4 Testing of Diode and Transistor
- 5 Study of half wave rectifier, full wave rectifier, bridge rectifier with and without filter
- 6 Study of Zener regulated power supply
- 7 Study of IC Regulated power supply (78XX and 79XX)
- 8 Study of transistor characteristics
- 9 To plot the characteristics of diode
- 10 To plot the characteristics of Zener diode
- 11 Study of transistor amplifier
- 12 Study of oscillator
- 13 Study of astable and monostable multivibrators using transistors and IC 555
- 14 Study of inverting and non-inverting amplifiers using IC 741 and calculation of its gain
- 15 Study of A.M. modulation

REFERENCES

1. Basic Electronics & Linear Circuits - : By Bhargawa , T.T.T.I. Chandigarh .
2. Basic Electronics - : By V.K. Mehta
3. Electronics Principal - : By mahta.
4. Digital Electronics - : By Mahino & Leach .
5. Electronics Devices & Circuits - : By G.K. Mithal



DEE 0401 ELECTRICAL MACHINES-II

UNIT I

Three phase Induction Motor -

Production of rotating magnetic field, principle, construction and types of induction motors. Equivalent circuit, torque equation, torque-slip characteristics. Types of starters: DOL, Star-delta, Autotransformer type, rotor resistance type, contactor type starter. Speed control. No load and blocked rotor test, losses and efficiency. Braking and applications. Simple numerical.

UNIT II

Synchronous motor -

Principle, construction, phasor diagram, effect of change in excitation, V curves, synchronous condenser, starting of motors, hunting and its prevention, coding of synchronous machines.

UNIT III

Synchronous generator -

Principle, construction, salient and cylindrical rotors, speed-frequency relationship, EMF equation, distribution and pitch factor, equivalent circuit, synchronous impedance, regulation, O.C.C. and S.S.C., load characteristics, phasor diagram, parallel operation. Methods of synchronization, power-angle characteristics.

UNIT IV

Single phase induction motors -

Principle, double revolving field theory. Types of motors with their construction, characteristics and applications. Comparison of three phase with single phase induction motors

UNIT V

AC commutator motors -

Introduction, series motor, compensated series motor, commutating poles, universal motor, repulsion motor. Special purpose machines - Induction motor, stepper motor, PM motor.

LIST OF PRACTICAL

- 1 Study of three phase induction motor (parts).
- 2 Measurement of slip of three phase induction motor.
- 3 Study of three phase induction motor starters.
- 4 Study of synchronous machine (parts).
- 5 OCC and SCC of synchronous generator and determination of regulation.
- 6 To plot V curves of synchronous motor.
- 7 Study of different single phase induction motors (construction).
- 8 Study of AC commutator motors (construction).
- 9 Study of special purpose motors (construction).



DEE-0402 General Mechanical Engineering

UNIT I

Introduction of Materials

Need and classification of engineering materials

Metals and alloys. Ferrous Metals-Cast Iron, Wrought Iron, Steel, Alloy Steel

Non Ferrous Metals- (i) Aluminum (ii) Copper (iii) Lead (iv) Tin (v) Copper tin-antimony alloy
(vi) Bearing Metals (vii) Copper tin alloy (viii) Zinc (ix) Copper Zinc alloy

UNIT II

Mechanical Properties and Tests:

Properties of Materials-

Stiffness, Strength, Ductility, Malleability, Elasticity, Plasticity, Toughness, Brittleness

Hardness and Harden ability, Fatigue Material Test-Tensile Test, Impact Test (Izod and Charpy),
Hardness Test (Brinell, Rockwell and Vickers)

Heat Treatment: Definition and objectives of Heat treatment, Effect of different factors in heat treatments, Heat treatment Process

(i) Annealing (ii) Normalizing (iii) Hardening by quenching (iv) Tempering

(v) Case hardening (vi) Carburizing

Thermodynamics: Introduction, Work, Heat & Power, Various thermodynamics properties
Thermodynamic system, Thermodynamic

(i) State of the System (ii) Process on the system

Statement of 1st and 2nd law of thermodynamics

Law of Ideal gases. (i) Boyle's Law (ii) Charles Law (iii) Gas equation

Properties of steam Enthalpy of Dry and wet steam Specific volume of dry and wet steam Internal
Energy of Dry and Wet Steam

UNIT III

Boilers

Classification of boilers, Fire tube, Water tube, Sketch and description of Simple vertical boiler,
Lankashire boiler, Babcock and Wilcox boiler, Locomotive boiler

I.C. ENGINE :

Define Heat Engine, Differentiate I.C. Engine and E.C. Engine, Classification of I.C. Engines.

Explain the working of two strokes and four stroke petrol engine with line diagram, Explain the

working of two stroke and four stroke diesel engine with line diagram- Indicated Horse Power (IHP)

Brake Horse Power (BHP) Mechanical Efficiency

AIR COMPRESSOR : Introduction of Air Compressor and their classification, Working principle of
reciprocating Air-compressor. Industrial uses of Air-compressor, Multistage reciprocating
compressor & their merit & Demerit Rotary compressor

UNIT IV

FLUID MECHANICS : Definition of various fluid properties, Fluid pressure and its measurement

Pascal's Law, Static Pressure, Intensity of pressure at a point in fluid at rest, Pressure head Absolute

and gauge pressure Simple and differential U type manometers. Total and center of pressure on the

plate surface immersed in water Horizontally and vertically.



HYDRODYNAMICS :

Energies in fluid

(i) Pressure energy (ii) Kinetic energy (iii) Potential energy (iv) Total energy
Bernoulli's theorem, its assumption and application, Pitot tube, Venturimeter
Orifice meter working principle of Hydraulic Pumps, Reciprocating pump, Centrifugal pump
Working Principles of water turbine- Impulse turbine, Reaction turbine

UNIT V

POWER TRANSMISSION :

Methods of Power transmission- Belt drive, Open and cross belt drive, Application and advantages of belt drive, Velocity ratio of pulleys, Compound belt drive, Effect of slip in the belt drive
Gear drive- Simple gear drive, Compound gear drive, Worm and wheel, Bevel gear, Velocity ratio in gear drive, Merit and demerits of gear drive, Simple problems of gear drive

LIST OF EXPERIMENTS

- 01 Perform Tensile Test of standard mild steel and C.I. specimen
- 02 Perform Hardness Test Brinell and Rockwell
- 03 Impact Test Izod and Charpy on mild steel specimen
- 04 Study of Boilers
 - a. Fire tube b. Water tube c. Babcock & Wilcox Boiler d. Boiler mountings
 - e. Boiler accessories
- 05 Study of steam engine
- 06 I.C. Engine a. Study of I.C. Engine Two stroke and four stroke Petrol & Diesel Engine
- 07 Air Compressor Study of Air Compressor, Single stage and multistage compressor their construction and their uses.
- 08 Fluid Mechanics & Machines
 - (i) Pressure measurement by manometer
 - (ii) Determination of coefficients of discharge of the following devices -
 - a. Venturi meter b. Rota meter
 - c. Orifice Meter d. Pitot tube
 - (iii) Study of Centrifugal & reciprocating pumps.



DEE-0403 ELECTRICAL ENGG. DRAWING

UNIT 1

Symbols and Notations -

Symbols of practical units, multiples and submultiples, types of supplies, single phase, three phase three wire, three phase four wire, D.C. supply etc. Accessories like main switches, distribution boards, fans, light fixtures, bell, buzzer, lighting arrestor. All types of motor starters, instruments, electronic components etc. Rating plate of machines.

Domestic Wiring -

All types of light circuits: Fluorescent tube circuits, intermediate switch circuits, fan circuits. Wiring of a residential building. Sodium vapor lamp, mercury vapor lamp.

UNIT II

Instrument Circuits -

Connection of meters in circuits. Ammeter, voltmeter, wattmeter, energy meter, Power factor meter, frequency meter, synchroscope etc. Extension of range using shunt, multiplier, current transformer, potential transformers etc.

Winding Diagrams -

Simplex type lap and wave diagrams for D. C. Machines. Single phase and three phase motor winding diagrams.

UNIT III

Electrical Machine Drawing -

Parts of D.C. machines like, magnetic poles, commutator, armature etc. A.C. machines rotor, slip rings, etc. Various cable sections. Bushing of the transformer. Assembly diagrams of D.C. machine, A.C. machine, and transformer.

Power Wiring -

Internal wiring diagrams of single phase motor. wiring diagrams of D.C. and A.C. motor starters like three point shunt motor starter, four point compound motor starter, direct on line (D.O.L.) starter, star- delta starter, contactor type and auto transformer starter. Internal connections of D.C. series, shunt and compound motors. Three phase motors: squirrel cage, slip ring, synchronous etc. Plate earthing and Pipe earthing as per I.S.S.

UNIT IV

Simple Electronic Circuits -

Battery eliminator, battery charger, single stage transistor amplifier, connections of common emitter, collector and base amplifier circuits.

Alternator Panel Diagrams -

Panel diagram with circuit breaker, isolator, measuring instruments, synchroscope. Over current and earth fault protection, differential protection, voltage regulator etc.

UNIT V

Transmission And Distribution

All types of transmission towers and distribution poles. Arrangement of various types of cross arms, with insulators, jumpers. Electrical layout of 33KV/ 11KV substation, 11KV/415V pole mounted substations with all protective devices etc.



DEE 0404 GENERATION, TRANSMISSION & DISTRIBUTION

UNIT I

Non Conventional Sources Of Energy -

Concept and need of primary and secondary energy sources, difference between conventional and non-conventional sources of energy, concept of solar , wind, biogas, ocean, tidal, geothermal, fuel cell , MHD and their practical applications.

Conventional Sources Of Energy -

Detailed study of generating stations - thermal, hydro, nuclear, schematic diagram, site selection main components and auxiliaries for above power stations. Study of gas turbines plant and diesel power plant. Advantages, disadvantages of thermal hydro, nuclear, gas turbine plant and diesel power plant.

UNIT II

Concept Of Load -

Types of load, load curve, load duration curve, connected load, demand factor, average load, maximum demand, load factor, diversity factor, plant utilization factor, capacity factor, reserve capacity. Simple numerical on above terms. Types of Tariff, flat rate, block rate, two part, maximum demand and power factor tariff. Their merits and demerits. Simple problems on above terms.

UNIT III

Concept of Transmission, single line diagram of complete power system, standard voltages of A.C. Transmission, efficiency (no derivation). H.V.D.C. transmission system, line diagram, advantages and Disadvantages of H.V.D.C. Sag, causes & effects of sag on transmission line, effect of wind, ice and temperature on sag. Types of line supports, type of joints, looms, earth wires, ground wire and vibration dampers. Importance of R,L,C in transmission line (no derivation), skin effect, transposition, corona, advantages and disadvantages of corona, methods of reducing corona, types of insulators, string efficiency and voltage distribution, grading ring and Arcing horn.

UNIT IV

Types of Transmission line, T and network of medium Transmission line, transmission efficiency, Ferranti effect, simple problems of short and medium Transmission line. Difference between overhead line and underground cables. Classification and construction of L.T. and H. T. cables, Methods of laying.

UNIT V

Classification of distribution system, ring main, radial and interconnected system. Concept of feeder, distributor and service mains in distribution system. Simple problems.



LIST OF EXPERIMENTS

1. Study of solar cooker.
2. Study of solar water heater.
3. Study of solar photo-voltaic cells. Study of wind mill.
4. Study of Bio Gas plant.
5. Study of steam power plant, hydro power plant, nuclear power plant. Study of line supports and insulators.
6. Determination of string efficiency of insulator string. Performance of short/ medium transmissions line.
7. Study of L.T. and H.T. Cables and over head conductors. Voltage distribution in radial and ring main system.
8. Visit to a
 - Substation.
 - Generating station.
 - Places where solar, wind, Biogas and tidal power plant are installed.

REFERENCE BOOK

Non Conventional energy sources

By S.L.Uppal, Khanna publisher Electrical Power

Power System

By G.D. Rai, Khanna publisher Electrical Power

By J.B. Gupta

By V.K. Mehta



DEE 0405(A) ENTREPRENEURSHIP

UNIT I.

INTRODUCTION TO ENTERPRENEURSHIP

Definition of Entrepreneur / Entrepreneur, Difference between Entrepreneurship / Entrepreneurship, Need for Entrepreneurship, qualities of successful entrepreneur, Myths about Entrepreneurship, Classification of entrepreneurs on the basis of different criteria, Reasons for the failure of entrepreneurs

UNIT II

INDUSTRIES AND BUSINESS ORGANIZATIONS

Concept of Industry or Enterprise, Classification of Industries

(a) On the basis of capital investment

Tiny (Micro) Industry, Small Scale, Medium Scale, Large Scale

(b) Others

Rural Industry, Cottage Industry

(c) Forms of Business Organization

Proprietorship, Board & Co-operative, Partnership, Public Ltd., Private Ltd., IT Sector, Government Co-operative / Undertakings

(d) Tiny small scale Industry

Definition, Its significance in National Development. Govt. policies for SSI promotions, Sector / Product for SSI.

INSTITUTIONAL ASSISTANCE

(a) Types of Institutional assistance

Infra - structural assistance, Technical Assistance, Financial assistance, Marketing Assistance

(b) Information / guidance & Training

SISI - ASK

- MPCON - CSIR

- CED- MA - NRDC (c) Infrastructure

- D/C - AVN/AKVN (e) Finance

- SIDBI - KVIB MPFC

- NABARD - MPWDC NSIC M.P.A.V.V.N.

(d) Marketing

- MP- AGRO

- NSIC

- PM.LUN

- EXPORT COPPORATION

- KVIP

- MPHSV N MPLDC

(e) Quality Control

- BIS - FPO - MPLUN F.D.A.

- AG. MKT. Board

UNIT III

INCENTIVES / CONCESSION / FACITLITIES AVAILABLE

Seed money, Incentive / subsidies, Others (Phones, Lands etc)



UNIT IV

PLANNING OF AN INDUSTRIAL UNIT (SSI)

Pre- Planning Stage, Scanning the environment, Market survey, Seeking information, product / project selection, Implementation Stage, PPR Preparation DIC registration Arrangement of Land Arrangement of Power Obtaining NOC / Licenses from various departments DPR Preparation Seeking financial assistance Commercial Production Post Implementation stage Permanent registration from D.I.C. Availing Subsidies Diversification / Modification Setting up of marketing channel / Distribution.

UNIT V

ACHIVEMENT MOTIVATION

Historical perspective

Concept of achievement motivation

Significance of achievement motivation

Development of achievement motivation

FINANCIAL MANAGEMENT OF AN INDUSTRIAL UNIT (SSI)

Tools of financial analysis Ratio analysis Fund Flow / Cash flow analysis Working capital and concepts Financial accounting



**PROJECT
WORK/ASSIGNMENT**

1. To prepare chart to showing various factors affecting entrepreneurship.
2. To collect details related to various schemes run by the Govt. For Self-Employment and Entrepreneurship.
3. To identify and select a project and conduct Market-Survey thereof.
4. To collect various formats used in industries & departments/institutions working in the field of entrepreneurship.
5. Visit few small scale industries situated in city, nearby industrial area.
6. Discuss the problems related to SSI (Small Scale Industries) with an entrepreneur.
7. Collect information about market rates quality and quantity of goods for their choice.
8. Develop logical and analytical approach to purchase the raw material / finished goods
9. To prepare case study of successful entrepreneurs.
10. Preparation of Project report for the industry/ Business they are willing to start.

REFERENCES

1. Entrepreneurial Development Vol. I,II,III
By Vasant desai Himalaya Publicaton
2. CEDMAP (Center of Entrepreneurial development Madhya Pradesh)
3. Udyamita Vikas
By Anand Prakashan



DEE 0405(B) MARKETINGMANAGEMENT

UNIT I

MARKETING & CONCEPT

Evolution of marketing-a historical background The stage of barter The stage of money economy The stage of industrial revolution The stage of competition The emergence of marketing Selected definitions of marketing

Different concept of marketing-The exchange concept, The production concept The product concept, The sales concept The marketing concept

Difference between selling & marketing- Benefits & significance of marketing, Helps to remove, causes for under development, Improve productivity & efficiency Canalize country's economic resources properly, Insure better deal for consumer, Make economic planning meaningful & relevant etc.

UNIT II

MARKETING ENVIRONMENT

Internal & external factors Demographic environment, Economic environment, Political environment, Physical environment, Technological environment, Competitive environment, Social & cultural environment, Micro & macro environment

Marketing planning & organization

Scope & importance of planning, Steps in marketing planning process Purpose & principle of organization Models of marketing organization Line & staff type Product based organization Territory oriented organization Complex organization Task of chief marketing executive Decentralization

Market segmentation

Types of market, Definitions & benefits of segmentation Method of segmentation, Geographic segmentation, Demographic segmentation, Psychographic segmentation, Buyer behavior Segmentation, Volume segmentation, Steps in market segmentation, Market targeting

Market mix

Definition of market mix Elements of marketing mix (4 P'S)-
Product,Place,Price,Promotion

UNIT III

Environmental variable (uncontrollable variables) Customer variable, Competition variable, Trade variable Environmental variable, Product management, Components of product,The core or basic constituent, The associated features, The brand names, package,label

Types of product- The generic product, The branded product, The differentiated product The customized product, The augmented & potential product The product line & product mix

New product development (NPD)

Significance & classification of new product, Stages in NPD Estimating the demand for new product



UNIT IV

Test marketing

Product life cycle (PLC), Concepts & benefits of PLC, Different, stages in PLC, Strategies used in different stages, Place management, Physical distribution, Definitions & importance of physical distribution, Designing the physical distribution system, The distribution channel, The role & importance of distribution channel, Planning & designing of distribution channel, Types of distribution intermediaries, Price management, The meaning & importance of pricing Objectives of pricing Factors affecting pricing –Internal & external Pricing methods, Cost based pricing, Break even pricing, Demand based pricing, Competition based pricing, Product line pricing, Tender pricing Affordability pricing, Differentiated pricing, Pricing policies & setting the price Promotion management, Sales promotion, Importance & objectives of sales promotion Tools & techniques of sales promotion, Advertising Role & importance of advertising, Types of advertising Deciding on the advertising budget, Evaluating advertising effectiveness

UNIT V

Difference between sales promotion & advertising

Understanding consumer, Factor influencing buyer behavior Information from variety of sources Socio-cultural environment of buyer Group influence Religion & language Concern about status uying motives –Product & patronage motive Buying habits – Convenience, shopping and spatiality goods Marketing research & sales forecasting, Definition & importance of marketing research Steps in marketing research Defining problem, Problem analysis Developing research design Developing research procedure Data collection –Primary & secondary Analyzing & interpretation Summarizing & preparing the research repor Method of market research Necessity & purpose of sales forecasting Methods of sales forecasting

LIST OF REFERENCE BOOKS

1. Marketing management - Analysis, Planning & Control - Philip Kotler
2. Principles & practice of Marketing in India - C.B.Memoria & R.L.Joshi
3. Contemporary Marketing – Louis & Bone & David L. Kurtz
4. Essential of Management –Koontz
5. Marketing management- S.A. Sherlekar



DEE-0501 INSTRUMENTATION

Unit I

Measuring System

Elements of a measuring system, Block diagram of system configuration, performance, standards, time lag, error, distortion and distortion meters, noise and noise factor.

Unit II

Transducers

Transducers definition and classification, mechanical devices as primary detectors, Characteristic & choice of Transducers, Electrical transducers, Advantages of electric transducers, Active and passive transducers, Classification, Resistive, inductive and capacitive transducers, Potentiometric, Metallic and semiconductor strain gauges, Gauge factor, types, material used and applications. Thermistor, RTD, Inductive, LVDT, RVDT and Capacitive transducers and their application. Thermocouples, Piezo-Electric transducers, principle, materials used, mode of operation and application. Frequency generating transducers. Hall effect transducers, Opto-electronic transducers such as photo voltaic, Photo conductive, and photo conductive cells, constructional details, characteristics and applications. Photo diodes and transistors, characteristics and applications. Digital transducers, Optical encoders for linear and angular displacement measurement.

Unit III

Signal Conditioners

Purpose of signal conditioning, Classification, Input modifier, Operational amplifiers circuits used in instrumentation, D.C.amplifier, chopper amplifier. Instrumentation amplifier, characteristics, three amplifier configuration. A/D and D/A converters.

Measurement of Physical Quantities:

Measurement of Pressure-Types of pressure measurement devices, Force summing devices, Secondary transducers, Low pressure measurement, Pirani gauge and thermocouple gauge. Resistive, Inductive and Capacitive pressure measuring devices.

Measurement of speed:

Measurement of speed by stroboscope, photoelectric and reluctance pick-up devices for speed measurement.

Measurement of Vibration-Necessity for Vibration Measurement, Seismic Transducer, Piezo-electric and

LVDT Accelerometers.

Measurement of Temperature-

Temperature measuring devices, Resistance thermometers, Radiation and Optical Pyrometers.

Measurement of Flow-

Turbine and electromagnetic flow meters, Ultrasonic flow meter, Thermal flow meters. Measurement of Humidity-Humidity, absolute and relative humidity, Resistive and Capacitive hygrometers. Measurement of pH Value-Concept, pH scale, pH cell, pH meter. Measurement of Thermal Conductivity (gas analyzer).

Measurement of level: Float and potentiometer method of flow measurement, Resistive and Capacitive methods, Ultrasonic and Gamma rays methods.

Measurement of Force and Torque-

Electronic weighing system, Hydraulic load cell. Torque measurement, concept, Stress and Deflection type torque measurement methods.



Unit IV

Telemetry

Necessity, Principle, classification, current and voltage telemetry, Position telemetry, synchros. Frequency and pulse telemetry, Principle of frequency and pulse modulation, PAM, PPM and PCM. Idea about landline and R.F. telemetry and multiplexing. Pulse code format, Modulation techniques of digital data transmission, Digital multiplexers.

Data Acquisition System

Introduction data acquisition system, generalized DAS, Single and multi channel DAS, Data loggers, Special encoders.

Unit V

Display Devices and Recorders:

Digital display system and indicators like CRT, Seven Segment LED , LED, LCD.

Analog and digital recorders, Strip and circular chart recorder and Magnetic tape recorder, X-Y recorders. Ultraviolet recorders, Frequency modulated (FM) recording. Digital tape recorders.

List of Practicals

1. Measurement of Distortion using wave distortion meter.
2. Measurement of load/weight using strain gauge and cantilever.
3. Measurement of linear displacement by LVDT and draw its characteristics.
4. Measurement of temperature by-
(a) Thermocouple (b) Resistance Thermometer
5. Measurement of pressure using LVDT and diaphragm gauge.
6. Study and use of data conversion using ADC and DAC.
7. Measurement of pH value using pH meter.
8. Measurement of Humidity by hygrometer.
9. Study and use of synchros in position telemetry system.
10. Measurement of Vibration using piezoelectric/LVDT transducer.
11. Study and flow measurement using electromagnetic flow meter.
12. Study of time division and frequency division multiplexing.
13. Measurement of liquid level by resistive/capacitive transducer.
14. Study and measurement of temperature using optical and radiation pyrometer.
15. Study of strip chart recorder and magnetic tape recorder.



DEE 0502 POWER SYSTEM OPERATION AND PROTECTION

UNIT-I

Introduction to power system -

Growth of power system in India, future schemes, various elements of power system. Interconnection, its necessity and advantages, planning, operation and improvement of power system. Load study, type of faults. AC/DC calculating board/digital computers.

Representation of power system -

Single line diagram, use of standard symbol. Per unit quantity - definition and advantages, base impedance conversion of per unit values from one base values to other base values. Generalized ABCD constants, their values in terms of circuit parameters. To prove $AD-BC=1$ characteristics of ABCD constants. The relations of Z_{so}, Z_{ro}, Z_{rs} in terms of generalized constants. 7

UNIT-II

Fault analysis -

Type of faults - symmetrical and unsymmetrical. Phase sequence impedance, phase sequence networks, analysis of symmetrical faults. Analysis of L-G, L-L and L-L-G fault by symmetrical components, simple numerical problems.

Modern trends -

E.H.T Lines, bundled conductors, HVDC system, block diagram, advantages and disadvantages. Block diagram of Power Line Carrier communication.

UNIT-III

Introduction to protection -

Purpose of protective system, requirement and selection. Abnormalities in a power system and their effects. Reasons for failure. Self and non self clearing faults. Use of CT/PT in protective scheme. Definition of terms regarding CT/PT. Advantages of CT/PT. Neutral earthing, their methods and advantages.

Protective relay -

Type of relays- induction, electromagnetic, thermal. Primary and back up relaying. Types of back up relays, causes of failure of primary relaying. Explanation of terms used in relaying. Principle and working of different types of relays- electromagnetic and induction type. Induction type over current relay, reverse power relay, time and current settings. Differential relays., distance relays, thermal relays, inverse current characteristics.

UNIT-IV



Circuit interruption devices -

Function of fuse. fusing factor, fusing characteristic. Application of isolator and circuit breakers. Circuit breaker capacities. Arc formation in C.B. and methods of arc extinction. Definition of various terms with reference to circuit interruption wave form. working principle and operation of Bulk Oil/Minimum oil/air blast/SF CB. Merits and Demerits of different types of C.B.

Protection against over voltages -

Causes and effects of over voltage. Traveling wave. Over-voltage protection, earth wire, lightning arresters- Multiple gap type, horn gap type, line type, station type and distribution type. Surge absorber. 6

UNIT-V

PROTECTIVE SCHEMES

Protection of alternator-

Various abnormalities, Merz price differential protection, over current and earth fault protection.

Protection of transformer -

Various abnormalities, differential protection, Buchholz relay.

Feeder and transmission line protection -

Time graded and over current protection, current graded system, differential protection.

Protection of Induction motors, use of thermal relays and under voltage protection



LIST OF EXPERIMENTS

- a. To determine the ABCD constants of a given / T network.
- b. To determine Z_{so} , Z_{ss} , Z_{ro} , Z_{rs} for a given / T network.
- c. Study of a HVDC system.
- d. Study and use of CT/PT employed for protection and determine their ratio error.
- e. Study of an Induction type O/C relay and plot the inverse characteristic.
- f. To plot the inverse characteristic (current/time) of a given fuse wire.
 - i. To determine the fusing factor of different fuse wire.
- g. To study the differential protection of transformer/alternator. Visit to power station
- h. Study of different protective elements/schemes- ground wire
Lightening arrestors, fuse, circuit breaker.
- i. Study of Min. Oil Circuit breaker



DEE-0503 POWER ELECTRONICS AND APPLICATIONS

UNIT-I

Thyristor -

SCR - Structure, Two transistor model, characteristics, turn-on methods, factor responsible for temperature rise, circuit for over voltage, over current, voltage surge & high dv/dt , Gate production. Modes of heat transfer. Triggering circuits - Resistance phase shift, UJT, Schmitt trigger. Turn-off types of commutation, methods of commutation. SCR rating, series and parallel connection. Thyristor family and other devices, DIAC, TRIAC, SCS, SUS, LASCR, MOSFET, IGRT, GTO, MCT.

UNIT-II

Rectification -

Single phase HW and FW converters. Mathematical relations of I_{dc} and I_{rms} . Applications Advantages of polyphase rectification.

UNIT-III

Inverter -

Series and parallel inverter, current and voltage source inverter, emergency tube light, comparison of inverters using different types of (transistor, MOSFET, IGRT) devices, block diagram of UPS (on load / off load). Applications of Inverter

UNIT-IV

Converter -

Block diagram of DC to DC converter. Converter duty cycle, 4-quadrant operation of choppers, applications. Working of single phase cyclo-converter, basic concept of three phase cyclo-converter, application of cyclo-converters.

UNIT-V

Speed control of Motors -

Advantages of electronic speed control, 4-quadrant operation of DC motors, constant torque and constant horse power operation, speed control of separately excited DC motor, single and 3 phase controlled rectifiers, field failure protection and armature current limiter, speed control using chopper, dual converter. Speed control of induction motor using rectifier, inverter and cyclo-convector (block diagram only). Speed control of slip ring induction motor using SCRS in rotor circuit.

Applications - High frequency heating - induction and dielectric, principle, applications. Resistance welding, electronic line contactor, heat control circuit. Static AC & DC switch, over voltage protection, time delay circuits, reversing switch with plugging logic and digit circuits, PF corrections



LIST OF PRACTICAL

1. Characteristics of thyristor family devices.
2. Study of single phase controlled rectifiers.
3. Study of emergency tube light
4. Study of SCR triggering circuits
5. Study of commutation circuits
6. Electronic speed control of d.c.motor
7. Electronic speed control of induction motor
8. Study of UPS
9. Study of chopper

REFERENCE BOOKS

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



DEE-0504 UTILIZATION OF ELECTRICAL POWER

UNIT-I

Electric drives

Merits and demerits of electric drives, factors governing selection of motors, drive requirements. Group and individual drive, starting and running characteristics of various motors. Selection of starters, hand operated and contactor type starters, liquid resistor type starter. Speed control of motors, load equalization, use of fly wheel. Motor enclosures, selection of motors for particular service, size and rating of motors.

UNIT-II

Electric heating

Advantages and disadvantages of electric heating, methods of electric heating. Principle of electric heating. Resistance heating, heating elements and alloys. Causes of failures of heating elements. Arc furnaces, principle, construction, working and uses. Induction heating principle, construction and use of Ajax Wyatt (core type) and coreless type. L.F. and H.F. induction furnaces. Dielectric heating principles and uses.

UNIT-III

Electric welding

Definition, classification of electrical welding, principle of arc welding. Qualities of a good weld. Welding defects. Resistance welding, advantages, classification, principle and working, comparison of resistance and arc welding process, A.C. & D.C. arc welding.

UNIT-IV

Illumination

Electromagnetic wave spectrum, solid and plane angle, definition of electrical terms in use, sensitivity of human eye. Luminous efficiency, horizontal and vertical laws of illumination, definition of terms used in lighting, lighting scheme, various types of lamps, their use and fittings.



UNIT-V

Power factor improvements Causes of low P.F., effects of low P.F., methods of improvement of P.F. and its economics. Electro-chemical processes and storage batteries Electro deposition and faraday's laws of electrolysis, various electro-chemical processes like electroplating, electro-extraction, regions. Storage batteries, classification, construction. Battery maintenance, battery charging, circuit diagram. Application of storage batteries.1

LIST OF PRACTICALS

1. Speed control of slip ring induction motor by variation of rotor resistance.
2. To verify the change in power factor by changing load parameters and its improvement using capacitance.
3. To draw 'V' curves of synchronous motor.
4. Study and operation of resistance oven and to control its temperature.
5. Study of dielectric / induction heating.
6. Measurement of luminous efficiency of lamps by lux meter.
7. Study and operation of various types of lamps.
8. Study of arc welding.
9. Report on visit/ video demonstration on heating system. Report on visit/video film on welding system



DEE 505 ESTIMATING AND COSTING

UNIT 1

Elements of Estimating

Principles of estimating purchase procedure, cost of materials, various charges like labor, stores, overhead tools, contingency etc.

UNIT II

Domestic and Industrial Wiring

Various types of wiring systems including P.V.C. pipe, their merits and demerits. Calculation of total load & selection of wire, preparation of estimates for a small residential building, big institution or office building. Estimate for single store yard, multistory building. Estimate for a small workshop and industrial installation, agricultural pump, domestic pump, floor mills etc. Estimation of total cost. Service connections

UNIT III

For a single storey and multistoried building, single phase and three phase service connections, various methods of service connections. Distribution of circuits for light and power load. (Guidance may be taken by the M.P. Electricity Boards estimates). Substations Various types of sub-stations, pole-mounted in-door and out-door substations. Estimating quantity and cost for a substation of a given specification.

UNIT IV

Overhead lines : H.T. & H.T. lines Preparation of estimate and costing of 11KV or 33KV line. Selection of routes. Estimates for distribution lines- Location of poles for a given situation or locality. Providing street lights, necessary hardware, stay arrangements, underground cables, providing services lines using underground cables Estimating and costing for repair/maintenance of electrical devices/equipments Estimates for repairing electrical equipment e.g.

UNIT V

Rewinding, assembling and testing of polyphase induction motor. Repairing of 3 phase starters. Repairing of single phase transformers. Repairing of devices like hot plate, press, mixer fan etc.



DEE 0601 ENERGY CONSERVATION AND MANAGEMENT

UNIT-I

Energy Scenario- Various types of renewable and non-renewable energy, energy consumption and use pattern, energy consumption and environment.

UNIT-II

.Energy Management and audit-Energy Management and its objectives, energy audit, need of energy audit, types of energy audit, energy auditing instruments.

UNIT-III

Waste heat recovery-Sources of waste heat, advantages of waste heat recovery, commercial waste heat recovery devices-Remunerator, Heat regenerators, heat pumps etc. Agricultural use of waste heat.

Heating ventilation and air conditioning-Definition of Heating, ventilation and air conditioning, Energy saving opportunities in Heating ventilation and air conditioning, Conducting Audit in Heating ventilation and air conditioning.

UNIT-IV

Role of maintenance in energy conservation-Types of maintenance- breakdown, predictive & preventive, maintenance and energy conservation.

Demand side management –Benefits, Demand side management Techniques, implementation of Demand side management programme, Tariff options of Demand side management.

UNIT-V

Energy efficient motor and drives-Motor efficiency, energy efficient motors, energy efficient electric drives, use of variable speed drives. Power factor improvement-Causes of low power factor, advantages of power factor improvement, methods of power factor improvement.. Energy conservation in various sectors- For residential and commercial sector in transportation in energy intensive industries. Co-Generation benefits, types of co-generation.Economic Analysis of energy conservation-Economic analysis of investment, Economic analysis techniques, Risk analysis.

REFERENCES

1. Energy Conservation and Management by S. K. Soni and Manoj Nair, Satya
2. Prakashan, New Delhi
3. Energy management- W.R.Murphy & G.M. ckey, Butter worths
4. Electrical Energy utilization & conservation – Dr. S.C.Tripathi
5. Four books published by BEE (Bureau of Energy Efficiency) Govt. of India



DEE-0602 INSTALLATION, MAINTANANCES, TESTING

Unit I

.Installation - Types of heavy Electrical equipment, unloading accessories precautions for unloading, installation of small and large machines of both static and rotating type.

Installation of pole mounted transformer. 5

UNIT-II

Commissioning - Tests required before commissioning procedure to be adopted for commissioning the electrical equipment in respect of -

(a) Mechanical fixture and alignment. (b) Electrical tests.

(c) Initial precautions for starting.

UNIT-III

Earthing - Reasons of earthing, earthing system, earth lead and its size, permissible earth resistance for different installations, improvement of earth resistance, double earthing, earth resistance measurement, rules for earthing.

Insulation testing and maintenance - Instruments used for measuring insulation resistance, reasons for deterioration of insulation resistance, improving insulation resistance, drying of insulation, Measurement of internal temperature of winding, vacuum impregnation / filtering of insulating oil, testing of insulating oil.

UNIT-IV

Preventive maintenance and environmental pollution prevention - Concepts of preventive maintenance, advantages, preventive maintenance schedule for transformer, induction motor, transmission line, circuit breaker and under-ground cable. Preventive measures to control environmental pollution results due to production of smokes gases flow of waste material and automatic reactions in research stations, plants, electrical and electronic equipments and accessories.

UNIT-V

Trouble Shooting - Normal performance of equipment, trouble shooting internal and external faults, instruments and accessories for trouble shooting, trouble shooting charts. Electrical Accidents and Safety Measures - Electrical accidents, Safety regulations, treatment of shock, fire extinguishers. Testing and maintenance of Relays and Circuit Breakers - Testing of Relays Factory test, commissioning test and preventive periodic maintenance test. Testing of circuit breakers, voltage test, type test, preventive maintenance of circuit breaker. Hot Line Maintenance - Meaning and advantages, special types of non-conducting materials used for tools for hot line maintenance.



LIST OF EXPERIMENTS

1. Maintenance of Overhead Lines. Maintenance of switchgear OCB
2. Maintenance of distribution transformer in distribution system. Routine / Preventive maintenance of induction motor in textile mills / industrial establishments.
 - (a) Shut down and energizing procedure.
 - (b) Accident report writing.
 - (c) Permit to work.
 - (d) Fire extinguisher.
3. Insulation oil testing.
4. Earth resistance testing.
5. Test report of electrical installation
6. Maintenance schedule.
7. Trouble shooting Report on hot line maintenance.



DEE-0603(A) ELECTRIC TRACTION (ELECTIVE)

UNIT-I

General Description of Electric Traction system in India- Electric Traction – advantage and disadvantages. Choice of traction system in India. System of Track Electrification.

UNIT-II

Description of various systems - D.C., 1-Phase low frequency A.C., 1-Phase high frequency, 3-Phase A.C. and Composite system. 25 K.V. A.C., 50 Hz System-Advantages and disadvantages. Problems associated with A.C traction system, current and voltage unbalance, production of harmonics and induction effects, comparison between A.C. and D.C. system,

UNIT-III

Power Supply Arrangements - High Voltage Supply Constituents of supply system substation, feeding post, feeding and sectioning arrangements, sectioning post, elementary section. Miscellaneous equipment at control posts and switching station. Major equipment at substation, transformer, circuit breaker, interrupters. Protection system for A.C. Traction A.C. Electric Locomotive. Block diagram of A.C. electric locomotive Overhead equipment (O.H.E.) Pentagonal O.H.E.- catenary construction. OHE Supporting structure Current collection system, current collection gear for OHE, pole collection bow collection, pantograph collector.

UNIT-IV

Air blast C.B. Tap Changer (on load) ,Transformer, Rectifier connection, Traction motor connection, Smoothing reactor Desirable characteristics of traction motors, Traction motors- suitability of motors for traction, D.C. Series motors, A.C. Series single phase, repulsion motor, 3-phase I.M. linear I.M.

Control of D.C. traction motor, series parallel control, energy saving with series parallel starting, metadyne control, multiple unit control. Requirements of breaking systems, types of electric breaking Conditions necessary to achieve regenerative breaking, suitability of motor.

UNIT-V

Train signaling- System of train lighting, special requirements of train lighting, methods of obtaining unidirectional polarity and constant output, Battery System. Failure of under frame generating equipment , Signaling, Requirements. Track circuits. Different signaling used, Traction Mechanics. Types of services Speed time curve, Simplified speed time curve, Average speed and schedule speed, Tractive effort, Power of traction motor, Specific energy consumption, factors affecting specific energy consumption. Mechanics of train movement Coefficient of adhesion, factors affecting the coefficient of adhesion.



LIST OF EXPERIMENTS

1. Draw speed current characteristic of d.c. series motor.
2. Draw speed torque characteristic of d.c. series motor.
3. Study of various methods for speed control of d.c.
4. Study of pole and bow current collector.
5. Study of pentagraph current collector.
6. Study of metadyne control system.

LIST OF REFERENCE BOOKS

1. Electric traction a.t. dover pitmin & sons.
2. Electric traction system equipment d.w.hingle pergamo press
3. Electric traction hand book. r. books pitman & sons.
4. Modern electric traction. h. pratap pritam burai & bros.



DEE 603(B) PROGRAM, PLE LOGIC CONTROLLER (ELECTIVE)

UNIT-I

Introduction to PLC, What is PLC ,Technical Definition of a PLC, Advantage of PLC,Chronological Evolution of a PLC, Type of PLC, Block diagram PLC , PLC Hardware, Timers &Counters- Relays, Ladder logic diagram, PLC Connection, Electrical Wiring diagram, JIC Wiring Symbols, Latches,Timer, Classification of Timer, PLC Counters, Operation of PLC Counter, Counter Parameters,Advance Instruction & Programming Techniques- Introduction, Comparison Instruction,

UNIT-II

Discussions on Comparison Instruction

- i. "EQUAL"
- ii. "NOTEQUAL"
- iii. "LESS THEN"
- iv. "LESS THEN OR EQUAL"
- v. "GRATER THEN"
- vi. "MASKED COMPARISION FOR EQUAL"
- vii. "LIMIT TEST"

Mathematical Instruction, Logical Instruction

Data handling Instruction Sr.no Course content Study of hours PLC Input-Output (I/O) Modules Power Supply

UNIT-III

Introduction

Classification of Input Output Modules Input-Output System Sinking Sourcing Special Input Modules RTD Input Module Stepper Motor Control Module Thermocouple Input Module Power Supply Configuring Power Line conditioner Reliability, Safety and Redundancy Filter

UNIT-IV

PLC Applications-

Distributed control system, (DCS Industrial control systems, (ICS) Programmable automation controller, (PAC). Industrial safety systems

UNIT-V

SCADA

Industrial Automation & Selection of Programmable Logic Controllers- Introduction Utility of automation Example of some simple Automated Systems Selection of PLC



LIST OF EXPERIMENTS

1. Develop a Simple Ladder Logic Program that will turn on an output X if input A and B or C is on
2. Develop a relay based Controller that will allow three switches in a room to control a single light
3. How temperature control system can be developed in a process industry
4. Develop a traffic control System
5. Speed control of Induction Motor

REFERENCES

1. PLC Programming Method and Application :-
-John R Hackworth
- Fredric D Hackworth
(publication:- Pearson Education)
2. Process Dynamic and control
-D.E.seborg
-T.F.Edgar
-D.A.Melichamp
(publication:-Wiley publication)
3. Programmable Controllers operation and Application
(publication :-PHI publication)
4. Programmable Logic Controllers and Industrial Automation an Introduction
By:- Madhuchanda Mitra and Samarjit Sen Gupta
(publication:-Penram International Publishing (India) Pvt.Ltd.
5. Programmable Logic Controllers
By:-W. Bolten
Programmable Logic Controllers and Industrial Automation
By:- Kelvin Collins
(publication:-Exposure Publishing)
6. Programmable Logic Controllers
By:-Collin Simpson
7. Programmable Logic Controllers
By:-Morriss Brian publication :-PHI



DEE-0604 MAJOR PROJECT

LIST OF SUGGESTED TOPICS

1. Solar power generating station
2. Wind power generating station
3. Load dispatch techniques in modern power system
4. Energy auditing of small industrial / commercial / residential / office building
Estimation and costing of wiring of industrial / commercial / residential / office building Load survey
5. Software based projects
6. Industry based projects