SYLLABUS

E01_ASSISTANT MANAGER/ACCOUNTS

Accounting

Accounting Standards, Introduction to Accounting Standards, Overview of Accounting Standard AS 1: Disclosure of Accounting Policies, AS 2: Valuation of Inventories
AS 3: Cash Flow Statements, AS 6: Depreciation Accounting, AS 7: Construction Contracts, AS 9: Revenue Recognition, AS 10: Accounting for Fixed Assets, AS 13: Accounting for Investments, AS 14: Accounting for Amalgamation - Financial statements of Company- Preparation of financial statements- Cash flow Statement (Profit and Loss Account, Balance Sheet and Cash Flow Statement)-Profit/Loss prior to incorporation-Accounting for Bonus Issue, Amalgamation and Reconstruction, Average Due Date and Account Current, Self-Balancing Ledgers, Financial Statements of Not-for-Profit Organizations, Accounts from Incomplete Records, Accounting for Special Transactions

(a) Hire purchase and installment sale transactions

(b) Investment accounts

(c) Insurance claims for loss of stock and loss of profit.

Issues in Partnership Accounts

Accounting in Computerized Environment

Business Laws

The Indian Contract Act, 1872, the Negotiable Instruments Act, 1881, The Payment of Bonus Act, 1965, The Employees' Provident Fund and Miscellaneous Provisions Act, 1952, The Payment of Gratuity Act, 1972

Company Law

The Companies Act, 2013, Preliminary, Prospectus, Share and Share capital

Ethics

Principles of Business Ethics, Environment Issues, Ethics in Workplace, Ethics in Marketing and Consumer Protection, Ethics in Accounting and Finance

Communication

Elements of Communication, Communication in Business Environment, Basic Understanding of Legal Deeds and Documents

Cost Accounting

Introduction to Cost Accounting, Materials, Labor, Overheads, Non-Integrated Accounts, Methods, Job and Batch, Contract, Operating, Process and Operation, Standard Costing, Marginal Costing, Budgets and Budgetary Control

Financial Management

Scope and Objectives of Financial Management, Time Value of Money, Financial Analysis and Planning, Financing Decisions, Types of Financing, Investment Decisions, Management of working capital

Income-tax

The Income-tax Act, 1961, Basic concepts, Residential status and scope of total income, Incomes which do not form part of total income (Sec 10), 5 Heads of income, Provisions of Clubbing, Set-off and carry forward of losses, Deductions from gross total income, Computation of total income and tax payable. Provisions concerning Advance tax and TDS, Provisions for filing of return of income.

Service tax

Concepts and general principles, Charge of service tax and Valuation, Payment of service tax and filing of returns

VAT

Concepts and general principles, Input Tax Credits and Composition Scheme for Small Dealers, VAT Procedures

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Advanced Accounting

Conceptual Framework for Preparation and Presentation of Financial Statements
Accounting Standards
AS 4: Contingencies and Events occurring after the Balance Sheet Date

AS 5: Net Profit or Loss for the Period, Prior Period Items and Changes in Accounting Policies

AS 11: The Effects of Changes in Foreign Exchange Rates

AS 12: Accounting for Government Grants

AS 16: Borrowing Costs

AS 19: Leases

AS 20: Earnings per Share

AS 26: Intangible Assets

AS 29: Provisions, Contingent Liabilities and Contingent Assets

Advanced Issues in Partnership Accounts, Company Accounts, Employee stock option plan and Buy back of securities, Amalgamation and Reconstruction, Underwriting of shares and debentures, Redemption of debentures, Accounting for Special Transactions, Insurance Companies, Banking Companies, Electricity Companies, Departmental accounts, Branch accounts including foreign branches

Auditing and Assurance

Auditing Concepts, Auditing and Assurance Standards, Preparation for an Audit, Internal Control, Vouching, Verification of Assets and Liabilities, Company Audit, Audit Report, Special Audits

Information Technology

Computer software, Data Storage, Retrievals and Data Base Management Systems, Computer Networks & Network Security, Internet and other technologies, Flowcharts, Decision Tables

Strategic Management

Business Environment, Business Policy and Strategic Management, Strategic Analyses Strategic Planning, Formulation of Functional Strategy, Strategy Implementation and Control, Reaching Strategic Edge

NE01- Station Controller cum Train Operator (SCTO)

Electrical Engineering

Basic Electrical Engg. And Electt. Measurements:

Concepts of currents, Voltage, Resistance, Power and energy, their units, Ohm's law. Circuit Law: Kirchhoff's law Solution of simple network problems, Network theorems and their applications, Electro-magnetism concept of flux, Emf, Reluctance, Magnetic circuits, Electro-magnetic induction, Self and mutual inductance.,A.C. fundamentals Instantaneous, Peak, R.m.s. And average values of alternating waves, Equation of sinusoidal wave form, Simple series and parallel a.c. Circuits consisting of R.L. and C. Resonance, Measurement and measuring instruments Moving coil and moving iron ammeters and voltmeters, Extension of range, Watt meters, Multimeters, Megger, Basic Electronics.

Electrical machines:

Basic principles D, C motors of generators, their characteristics, Speed control and starting of D.C. motors, Losses and efficiency of D.C. machines.

1-phase and 3-phase Transformers:

Principles of Operation, Equivalent Circuit, Voltage Regulation O.C. And S.C. Tests, Efficiency, Auto Transformers, Synchronous Machines, Generation Of Three Phase Emf, Armature Reaction, Voltage Regulation, Parallel Operation Of Two Alternators, Synchronizing, Staring And Applications Of Synchronous Motors, 3-Phase Induction Motor, Rotating Magnetic Field, Principle Of Operation, Equivalent Circuit, Torque Speed Characteristics, Starting And Speed Control Of 3-Phase Induction Motors, Fractional Kw Motors, 1-Phase Induction Motors A.C. Series Motor, Reluctance Motor.

General, Transmission and Distribution:

Different types of power stations, Load factor, Diversity factor, Demand factor, Simple problems thereon, Cost of generation inter connection of power stations, Power factor improvement, Various types of tariffs, Types of faults Short circuit current for symmetrical faults, Switchgears-rating of circuit breakers: Principles of a are extinction by oil and air, H.R.C. fuses, Protection earthier leakage, Over current Buchhotgz relayMerz-Prince system of protection of generators & transformers, Protection of feeders and bus bars., Lightning arresters, Various transmission and distribution systems, Comparison of conductor materials. Efficiency for different systems.

Utilization of Electrical Energy:

Illumination, Electric heating, Electric welding, Electroplating, Electric drivers and motors.

NE01- Station Controller cum Train Operator(SCTO)

Electronics, Electronics & Telecommunication

Syllabus

Electronics / Electronics & Telecommunication

BASIC ELECTRICAL ENGINEERING

Basic concepts and principles of D.C and A.C fundamental, A C circuits, batteries, electromagnetic induction etc. including constant voltage and current sources.

ANALOG ELECTRONICS

Fundamental concepts of basic electronics and basic understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD; working of transistors in various configurations; Concept of FETs and MOSFET etc.

CONTROL SYSTEMS

Basic elements of control system, open loop control system, closed loop control system, control system terminology, manually controlled closed loop systems, automatic controlled closed loop systems, basic elements of a servo mechanism, Examples of automatic control systems, use of equivalent systems for system analysis, linear systems, non-linear systems, control system examples from chemical systems, mechanical systems, electrical systems, introduction to Laplace transform.

Transfer function analysis of ac and dc servomotors synchros, stepper motor, amply dyne. ac position control system, magnetic amplifier.

Control system representation: Transfer function, block diagram, reduction of block diagram, problems on block diagram, Mason's formula signal flow graph

Time Response Analysis : Standard test signals, time response of first and second-order system, time constant, time response of second order system, time response specifications, steady-state errors and error constants, problems in first and second order system.

Stability: Routh Hurwitz Criterion, Root Locus, Bode Plotting using semi log graph paper

Introduction to multiloop control system and its types, feedforward, cascade, ratio, split range, control system. Study of different processes using above mentioned control systems

Non-Linear Control System : Introduction, behaviour of non-linear control system. Different types of nonlinearities, saturation, backlash, hysteris, dead zone, relay, fiction, characteristics of non-linear control system, limit cycles, jump resonance, jump phenomenon. Difference between linear and non-linear control system.

ELECTRONIC COMPONENTS AND MATERIALS

Materials :

Classification of materials , Conducting, semi-conducting and insulating materials through a brief reference to their atomic structure.

Conducting Materials : Resistors and factors affecting resistivity such as temperature, alloying and mechanical stressing. Classification of conducting materials into low resistivity and high resistivity materials.

Insulating Materials : Important relevant characteristics (electrical, mechanical and thermal) and applications of the following material: Mica, Glass, Copper, Sliver, PVC, Silicon, Rubber, Bakelite, Cotton, Ceramic, Polyester, Polythene and Varnish.

Magnetic Materials : Different Magnetic materials; (Dia, Para, Ferro) and their properties. Ferro magnetism, Domains, permeability, Hysteresis loop. Soft and hard magnetic materials, their examples and typical applications.

MEASURING INSTRUMENTS

Introduction to Testing and Measurements, Measurement of Resistance, Inductance and Capacitance, Ammeter, Voltmeter and Multimeter, Power and Energy Measurements, Frequency and Phase difference Measurement

PRINCIPLES OF INSTRUMENTATION

Basic building blocks of any instrumentation systems, Performance characteristics of Oscillator Instruments, Instrument selection: Factors affecting instrument selection, accuracy, precision, linearity, resolution, sensitivity, hysteresis, reliability, serviceability, loading effect, range advantage and limitation, cost effectiveness and availability - Static and dynamic response - Environmental effects - Calibration tools

FUNDAMENTALS OF DIGITAL ELECTRONICS

Concepts of Digital electronics, Number system , gates, codes, arithmetic logic circuits, flip-flops, shift resistors and counters.

BASIC OF Microprocessors

Architecture of a typical microprocessor, configurations and instructional pair configuration systems and working of various peripheral interface chips. 8085 Microprocessors, architecture, instruction sets and introduction to 8086.

POWER ELECTRONICS

Introduction to thyristors and other power Electronics devices, Controlled Converters, Inverters, Choppers.

COMPUTER AIDED INSTRUMENTATION

Computer aided Instrumentation, Buses and Standards : Introduction , BUS types : The I/O BUS a) ISA bus b) EISA Bus c) PCI bus , GPIB 2.5 RS-232, Linear Circuits and Signal Conditioning, Parallel Port (PP) Interfacing Techniques, Serial Port (SP) Interfacing Techniques, USB Port Interfacing Techniques.

QUALITY AND RELIABILITY TECHNIQUES

Quality organization and Management: Introduction, Quality Policy, Task for Quality and Introduction to Total Quality Systems

Quality costs : Prevention costs, appraisal costs, internal failure costs, external failure costs, impact of quality costs on profitability

NE03- Jr. Engineer/ (Electrical)

Basic Electrical Engg. And Electt. Measurements:

Concepts of currents, Voltage, Resistance, Power and energy, their units, Ohm's law. Circuit Law: Kirchhoff's law Solution of simple network problems, Network theorems and their applications, Electro-magnetism concept of flux, Emf, Reluctance, Magnetic circuits, Electro-magnetic induction, Self and mutual inductance.,A.C. fundamentals Instantaneous, Peak, R.m.s. And average values of alternating waves, Equation of sinusoidal wave form, Simple series and parallel a.c. Circuits consisting of R.L. and C. Resonance, Measurement and measuring instruments Moving coil and moving iron ammeters and voltmeters, Extension of range, Watt meters, Multimeters, Megger, Basic Electronics.

Electrical machines:

Basic principles D, C motors of generators, their characteristics, Speed control and starting of D.C. motors, Losses and efficiency of D.C. machines.

1-phase and 3-phase Transformers:

Principles of Operation, Equivalent Circuit, Voltage Regulation O.C. And S.C. Tests, Efficiency, Auto Transformers, Synchronous Machines, Generation Of Three Phase Emf, Armature Reaction, Voltage Regulation, Parallel Operation Of Two Alternators, Synchronizing, Staring And Applications Of Synchronous Motors, 3-Phase Induction Motor, Rotating Magnetic Field, Principle Of Operation, Equivalent Circuit, Torque Speed Characteristics, Starting And Speed Control Of 3-Phase Induction Motors, Fractional Kw Motors, 1-Phase Induction Motors A.C. Series Motor, Reluctance Motor.

General, Transmission and Distribution:

Different types of power stations, Load factor, Diversity factor, Demand factor, Simple problems thereon, Cost of generation inter connection of power stations, Power factor improvement, Various types of tariffs, Types of faults Short circuit current for symmetrical faults, Switchgears-rating of circuit breakers: Principles of a are extinction by oil and air, H.R.C. fuses, Protection earthier leakage, Over current Buchhotgz relayMerz-Prince system of protection of generators & transformers, Protection of feeders and bus bars., Lightning arresters, Various transmission and distribution systems, Comparison of conductor materials. Efficiency for different systems.

Utilization of Electrical Energy:

Illumination, Electric heating, Electric welding, Electroplating, Electric drivers and motors.

NE04- Jr. Engineer/ (S&T)

BASIC ELECTRICAL ENGINEERING

Basic concepts and principles of D.C and A.C fundamental, A C circuits, batteries, electromagnetic induction etc. including constant voltage and current sources.

ANALOG ELECTRONICS

Fundamental concepts of basic electronics and basic understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD; working of transistors in various configurations; Concept of FETs and MOSFET etc.

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Basic elements of control system, open loop control system, closed loop control system, control system terminology, manually controlled closed loop systems, automatic controlled closed loop systems, basic elements of a servo mechanism, Examples of automatic control systems, use of equivalent systems for system analysis, linear systems, non-linear systems, control system examples from chemical systems, mechanical systems, electrical systems, introduction to Laplace transform.

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Materials :

Classification of materials , Conducting, semi-conducting and insulating materials through a brief reference to their atomic structure.

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MEASURING INSTRUMENTS

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Concepts of Digital electronics, Number system , gates, codes, arithmetic logic circuits, flip-flops, shift resistors and counters.

BASIC OF Microprocessors

Architecture of a typical microprocessor, configurations and instructional pair configuration systems and working of various peripheral interface chips. 8085 Microprocessors, architecture, instruction sets and introduction to 8086.

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QUALITY AND RELIABILITY TECHNIQUES

Quality organization and Management: Introduction, Quality Policy, Task for Quality and Introduction to Total Quality Systems

Quality costs : Prevention costs, appraisal costs, internal failure costs, external failure costs, impact of quality costs on profitability

NE05-Jr Engineer (Civil)

Building Materials:

Physical and Chemical properties, Classification, Standard tests, Uses and manufacture/quarrying of materials e.g. building stones, silicate based materials, cement (Portland), Asbestos products, Timber and Wood based Products, laminates, bituminous materials, paints, varnishes.

Surveying:

Principles of surveying, working of prismatic compass and bearings, Plane table surveying, Theodolite traverse, Adjustment of theodolite, Levelling and contouring, Curvature, Refraction correction, Permanent adjustment of dumpy level, Methods of contouring and uses of a contour map, Tachometric survey.

Soil Mechanics:

Origin of soil phase diagram, Definitions, Of void ratio porosity, Degree of saturation, Water content specific gravity of soil grains and unit weights, Grain size distribution curves for different solid and their uses, Atterjerg's limits isi soil classification, Plasticity chart, Coefficient of permeability, Effective stress, Consolidation of soils.

Soil:

Calculation shear strength of soils, direct shear test, Vane shear test, Triaxial test, Soil compaction, Lab compaction Lab compaction test, Moisture content and bearing capacity of soils, Plate load test, and Standard penetration test.

Hydraulics:

Fluid properties, Hydrostatics, Measurements of flow, Bernoulli's theorem and its application, Floor through pipes, Flow in open channels, Weirs, Flumes, Spillways, Pumps and turbines.

Environmental Engineering:

Quality of water, Source of water supply, Purification of water, Distribution of water, Need of sanitation, Sewerage systems, Circular sewers, Oval sewer, Sewer appurtenances, Surface water drainage sewage treatments.

NE06- Office Assistant (HR)

Organisation Theory :

Nature and Concept of Organisation; External Environment of Organizations -Technological, Social, Political, Economical and Legal; Organizational Goals - Primary and Secondary goals, Single and Mul t iple Goals; Management by Objectives.

Evolution of Organisation Theory: Classical, Neo-classical and Systems Approach. Modern Concepts of Organisation Theory:Organisat ional Design, Organisat ional Structure and Organisational Culture.

Organisational Design–Basic Challenges; Differentiation and Integration Process; Centralization and Decentralization Process; Standardization / Formalization and Mutual Adjustment. Coordinating Formal and Informal Organizations. Mechanistic and Organic Structures

Designing Organizational structures–Authority and Control; Line and Staff Functions, Specialization and Coordination. Types of Organization Structure –Functional. Matrix Structure, Project Structure. Nature and Basis of Power , Sources of Power, Power Structure and Politics. Impact of Information Technology on Organizational Design and Structure. Managing Organizational Culture

Organisation Behaviour:

Meaning and Concept; Individual in organizations: Personality, Theories, and Determinants; Perception - Meaning and Process.

Motivation: Concepts, Theories and Applications. Leadership-Theories and Styles. Quality of Work Life (QWL): Meaning and its impact on Performance, Ways of its Enhancement. Quality Circles (QC) – Meaning and their Importance. Management of Conflicts in Organizations. Transactional Analysis, Organizational Effectiveness, Management of Change.

Human Resources Management(HRM) & DEVELOPMENT:

Meaning, Nature and Scope of HRM, Human Resource Planning, Job Analysis, Job Description, Job Specification, Recruitment Process, Selection Process, Orientation and Placement, Training and Development Process, Performance Appraisal and 360° Feed Back, Salary and Wage Administration, Job Evaluation, Employee Welfar

NE07- Account Assistant

Financial Accounting :

Accounting as a Financial Information System; Impact of Behavioral Sciences. Accounting Standards e.g., Accounting for Depreciation, Inventories, Research and Development Costs, Long-term Construction Contracts, Revenue Recognition, Fixed Assets, Contingencies, Foreign Exchange Transactions, Investments and Government Grants, Cash Flow Statement, Earnings Per Share. Accounting for Share Capital Transactions including Bonus Shares, Right Shares, Employees Stock Option and Buy- Back of Securities. Preparation and Presentation of Company Final Accounts. Amalgamation, Absorption and Reconstruction of Companies.

Cost Accounting :

Nature and Functions of Cost Accounting. Installation of Cost Accounting System. Cost Concepts related to Income Measurement, Profit Planning, Cost Control and Decision Making.

Methods of Costing: Job Costing, Process Costing, Activity Based Costing. Volume – cost – Profit Relationship as a tool of Profit Planning.

Incremental Analysis/ Differential Costing as a Tool of Pricing Decisions, Product Decisions, Make or Buy Decisions, ShutDown Decisions etc. Techniques of Cost Control and Cost Reduction: Budgeting as a Tool of Planning and Control. Standard Costing and Variance Analysis. Responsibility Accounting and Divisional Performance Measurement.

Taxation :

Income Tax: Definitions; Basis of Charge; Incomes which do not form Part of Total Income. Simple problems of Computation of Income (of Individuals only) under Various Heads, i.e., Salaries, Income from House Property, Profits and Gains from Business or Profession, Capital Gains, Income from other sources, Income of other Persons included in Assessee's Total Income . Set - Off and Carry Forward of Loss.Deductions from Gross Total Income. Salient Features/Provisions Related to VAT and Services Tax.

Business Law

The Indian Contract Act, 1872, The Negotiable Instruments Act, 1881, The Payment of Bonus Act, 1965, The Employees' Provident Fund and Miscellaneous Provisions Act, 1952, The Payment of Gratuity Act, 1972

Auditing :

Company Audit: Audit related to Divisible Profits, Dividends, Special investigations, Tax audit. Audit of Banking, Insurance, Non-Profit Organizations and Charitable Societies/ Trusts/Organizations.

Financial Management :

Finance Function: Nature, Scope and Objectives of Financial Management: Risk and Return Relationship.

Tools of Financial Analysis: Ratio Analysis, Funds-Flow and Cash-Flow Statement.Capital Budgeting Decisions: Process, Procedures and Appraisal Methods. Risk and Uncertainty Analysis and Methods.

Cost of capital: Concept, Computation of Specific Costs and Weighted Average Cost of Capital. CAPM as a Tool of Determining Cost of Equity Capital.

Financing Decisions: Theories of Capital Structure - Net Income (NI) Approach, Net Operating Income (NOI) Approach, MM Approach and Traditional Approach. Designing of Capital structure: Types of Leverages (Operating, Financial and Combined) EBIT- EPS Analysis, and other Factors.

Dividend Decisions and Valuation of Firm: Wal ter 's Model , MM Thesis, Gordan's Model Lintner's Model. Factors Affecting Dividend Policy.Working Capital Management: Planning of Working Capital. Determinants of Working Capital. Components of Working Capital - Cash, Inventory and Receivables. Corporate Restructuring with focus on Mergers and Acquisitions (Financial aspects only)

Financial Markets and Institutions :
Indian Financial System: An Overview Money Markets: Participants, Structure and Instruments. Commercial Banks. Reforms in Banking sector. Monetary and Credit Policy of RBI. RBI as a Regulator.

Capital Market: Primary and Secondary Market. Financial Market Instruments and Innovative Debt Instruments; SEBI as a Regulator.

Financial Services: Mutual Funds, Venture Capital, Credit Rating Agencies, Insurance and IRDA.
Organisation Theory and Behaviour, Human Resource Management and Industrial Relations

Organisation Theory :

Nature and Concept of Organisation; External Environment of Organizations -Technological, Social, Political, Economical and Legal; Organizational Goals - Primary and Secondary goals, Single and Mul t iple Goals; Management by Objectives.

Evolution of Organisation Theory: Classical, Neo-classical and Systems Approach. Modern Concepts of Organisation Theory:Organisat ional Design, Organisat ional Structure and Organisational Culture.

Organisational Design–Basic Challenges; Differentiation and Integration Process; Centralization and Decentralization Process; Standardization / Formalization and Mutual Adjustment. Coordinating Formal and Informal Organizations. Mechanistic and Organic Structures

Designing Organizational structures–Authority and Control; Line and Staff Functions, Specialization and Coordination. Types of Organization Structure –Functional. Matrix Structure, Project Structure. Nature and Basis of Power , Sources of Power, Power Structure and Politics. Impact of Information Technology on Organizational Design and Structure. Managing Organizational Culture

Organisation Behaviour:
Meaning and Concept; Individual in organizations: Personality, Theories, and Determinants;

Perception - Meaning and Process.

Motivation: Concepts, Theories and Applications. Leadership-Theories and Styles. Quality of Work Life (QWL): Meaning and its impact on Performance, Ways of its Enhancement. Quality Circles (QC) – Meaning and their Importance. Management of Conflicts in Organizations. Transactional Analysis, Organizational Effectiveness, Management of Change.

Human Resources Management(HRM):

Meaning, Nature and Scope of HRM, Human Resource Planning, Job Analysis, Job Description, Job Specification, Recruitment Process, Selection Process, Orientation and Placement, Training and Development Process, Performance Appraisal and 360° Feed Back, Salary and Wage Administration, Job Evaluation, Employee Welfare, Promotions, Transfers and Separations.

NE08_Maintainer (Electrical)

CONTENT
Occupational Safety and Health Basic safety introduction, Personal protection.
Fundamental of electricity. Electron theory-free electron, Fundamental terms, definitions, units and effects of electric current
Ohm's Law
Kirchoff's Laws and applications.
Introduction of National Electrical Code, Voltage grading of different types of Insulators
Common Electrical wiring Accessories, their specifications in line with NEC -Explanation of switches, lamp holders, plugs and sockets.
Faraday's Law of electrolysis. Basic principles of Electroplating and Electro chemical equivalents.
Concept of Frequency, Peak factor, form factor.
A.C. circuits, single phase and three-phase system etc.
Earthing - Principle of different methods of earthing. i.e. Pipe, Plate, etc
Basic electronics- Semiconductor energy level, atomic structure 'P' type and 'N' type.
Amplifiers. – class A,B and C
Power amplifier
Introduction of basic concept of ICs, U.J.T.,F.E.T.
Digital Electronics -Binary numbers, logic gates and combinational circuits, Electric wirings & Voltage drop concept.
D.C. Machines - General concept of Electrical Machines.
Principle of D.C. generator.
DC Motors - Terms used in D.C. motor-Torque, Brake Torque, speed, Back-e.m.f. etc.
Working principle of **Transformer**.
Electrical Measuring Instruments --types, indicating types.
Three phase Induction motor –Working principle
POWER GENERATION : Generation sources of energy, Comparison of energy resources.
TRANSMISSION OF ELECTRICAL POWER: Electrical Supply System :Comparison of AC and DC transmission. Advantages of High

NE09_Maintainer(S&T)

Ohm's law and its variables. Resistor-definition, types of resistors, their construction & specific use, color-coding, power rating.

Working principle of a Transformer, Transformer construction, cores used. Specifications transformer, Step-up, isolation transformers applications.

Semiconductor component number coding for different electronic components such as Diodes, Zeners. PN Junction, Forward and Reverse biasing of diodes, Interpretation of diode specifications Forward current and Reverse voltage, packing styles of diodes. Diode Bridge Modules. Rectifier configurations, their efficiencies, Filter components and their role in reducing ripple.

Construction, Working of a PNP and NPN Transistors. Purpose of E, B & C Terminals. Flow of currents into and out of terminals of PNP/ NPN Transistors and their relations. Significance of β of a Transistor Need for Biasing of Transistor junctions, Interpretation of main parameters of a Transistor.VBE, VCB,VCE, IC, IB, Junction Temperature, junction capacitance, Frequency of operation, Discuss a Transistor application as a switch. Discuss a Transistor application as an amplifier. Define input impedance and output impedances Transistor power ratings & packaging styles, use of different heat sinks.

Transistor (CB, CE & CC) configurations and their characteristics and applications Transistor biasing circuits and stabilization Techniques.

Working of MOSFET, Power MOSFET andIGBT-theirtypes, characteristics, switching speed, powerratings and protection.

Introduction to Digital Electronics. Difference between analog and digital signals, Logic familiesand their comparison,Logiclevelsof TTLandCMOS.Numbersystems (Decimal, binary, octal, Hexadecimal) BCD code,ASCII code and code conversions. Logic Gates and their truth tables, propagation delay, power dissipation and noise immunity

Combinational logic circuits such as Half Adder, Full adder, Parallel Binary adders, 2-bit and four bit full adders. Magnitude comparators. Half adder, full adder ICs and their applications for implementing arithmetic operations

Introduction to Flip-Flop.S-RLatch, Gated S-R Latch, D- Latch.Flip- Flop:Basic RS Flip Flop, edge triggered D Flip Flop, JK Flip Flop, T Flip Flop, Master-Slave flip flops and Timing diagrams, Basic flip flop applications like datastorage, data transfer and frequency division.

Concept of UPS, Difference between Inverters and UPS. Basic block diagram of UPS & operating principle, explanation of rectifier, battery, inverter, static transfer switch. Types of UPS : Off line UPS, On line UPS, Line interactive UPS & their comparison UPS specifications.

NE10_Maintainer (Civil)

1. Linear measurements- its units, dividers, calipers, hermaphrodite, centre punch, dot punch, their description and uses of different types of hammers. Description, use and care of 'V' Blocks, marking off table.

2. Physical properties of engineering metal: color, weight, structure, and conductivity, magnetic, fusibility, specific gravity. Mechanical properties: ductility, malleability hardness, brittleness, toughness, tenacity, and elasticity.

3. Vernier calipers, principle, construction, graduations, reading, use and care. Vernier bevel protractor, construction, graduations, reading, use and care, dial Vernier Caliper, Digital Vernier caliper.

4. Drilling processes: common type (bench type, pillar type, radial type), gang and multiple drilling machine.
Determination of tap drill size.

5. Solders-composition of various types of solders, and their heating media of soldering iron, fluxes types, selection and application-joints.

6. Safety-importance of safety and general precautions observed in a welding shop. Precautions in electric and gas welding.

7. Oxygen acetylene cutting-machine description, parts, uses, method of handling, cutting torch-description, parts, function and uses.

8. Drill- material, types, (Taper shank, straight shank) parts and sizes. Drill angle-cutting angle for different materials, cutting speed feed. R.P.M. for different materials. Drill holding devices- material, construction and their uses.

9. Method of expressing tolerance as per BIS Fits: Definition, types description of each.

10. Cast Iron: manufacturing process by using (cupola furnace) types, properties and uses. Wrought iron- : manufacturing process (Fuddling and Astor process) properties and uses. Steel: manufacturing process plain carbon steels, types, properties and uses.

11. Safely precautions to be observed while working on a lathe, Lathe specifications, and constructional features. Lathe main parts descriptions- bed, head stock, carriage, tail stock, feeding and thread cutting mechanisms. Lathe cutting tools- Brief study of the nomenclature of Lathe cutting tools

12. Description and uses of gauge- types (feeler, screw, pitch, radius, wire gauge).

13. Locking device: Nuts- types (lock nut castle nut, slotted nuts, swam nut, grooved nut) Description and use.

14. Lapping: Application of lapping, material for lapping tools,

15. Honing: Application of honing, material for honing, tools shapes, grades, honing abrasives. Frosting- its aim and the methods of performance.

16. Roller and needle bearings: Types of roller bearing. Description & use of each Industrial visit.

17. Hardening and tempering, purpose of each method, tempering color chart.

18. Annealing and normalizing, purpose of each method.

19. Pipes and pipe fitting- commonly used pipes. Pipe schedule and standard sizes. Pipe bending methods. Use of bending fixture, pipe threads- Std. Pipe threads Die and Tap, pipe vices.

20. Standard pipefitting-. Methods of fitting or replacing the above fitting, repairs and erection on rainwater drainage pipes and house hold taps and pipe work. Use of tools such as pipe cutters, pipe wrenches, pipe dies, and tap, pipe bending machine etc.

21. Power transmission elements.

22. Power transmissions, coupling types-flange coupling,-Hooks coupling-universal coupling and their different uses.

23. Lubrication and lubricants- Method of lubrication. How a film of oil is formed in journal. Bearings, method of lubrication-gravity feed, force (pressure) feed, splash lubrication.

24. Installation, maintenance and overhaul of machinery and engineering equipment and Hydraulics & pneumatic symbols & exercise. Hydraulics pneumatic circuits. Clutch: Type, positive clutch (straight tooth type, angular tooth type).