

E01: ASSISTANT MANAGER – CIVIL

Structural Engineering

Engineering Mechanics: System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Friction and its applications; Kinematics of point mass and rigid body; Centre of mass; Euler's equations of motion; Impulse-momentum; Energy methods; Principles of virtual work.

Solid Mechanics: Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Theories of failures; Simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, buckling of column, combined and direct bending stresses.

Structural Analysis: Statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.

Construction Materials and Management: Construction Materials: Structural steel - composition, material properties and behaviour ; Concrete - constituents, mix design, short-term and long-term properties; Bricks and mortar; Timber; Bitumen. Construction Management: Types of construction projects; Tendering and construction contracts; Rate analysis and standard specifications; Cost estimation; Project planning and network analysis - PERT and CPM.

Concrete Structures: Working stress, Limit state and Ultimate load design concepts ; Design of beams, slabs, columns; Bond and development length; Prestressed concrete; Analysis of beam sections at transfer and service loads.

Steel Structures: Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections – simple and eccentric, beam-column connections, plate girders and trusses; Plastic analysis of beams and frames.

Geotechnical Engineering

Soil Mechanics: Origin of soils, soil structure and fabric; Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification system; Permeability - one dimensional flow, Darcy's law; Seepage through soils - two-dimensional flow, flow nets, uplift pressure, piping; Principle of effective stress, capillarity, seepage force and quicksand condition; Compaction in laboratory and field conditions; One dimensional consolidation, time rate of consolidation; Mohr's circle, stress paths, effective and total shear strength parameters, characteristics of clays and sand.

Foundation Engineering: Sub-surface investigations - scope, drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Earth pressure theories - Rankine and Coulomb; Stability of slopes - finite and infinite slopes, method of slices and Bishop's method; Stress distribution in soils - Boussinesq's and Westergaard's theories, pressure bulbs; Shallow foundations - Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays; Deep foundations - types of piles, dynamic and static formulae, load capacity of piles in sands and clays, pile load test, negative skin friction.

Water Resources Engineering

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum, energy and corresponding equations; Potential flow, applications of momentum and energy equations; Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth.

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Kinematics of flow, velocity triangles; Basics of hydraulic machines, specific speed of pumps and turbines; Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, slope profile, hydraulic jump, uniform flow and gradually varied flow

Environmental Engineering

Water and Waste Water: Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage

treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, effluent discharge standards. Domestic wastewater treatment, quantity of characteristics of domestic wastewater, primary and secondary treatment. Unit operations and unit processes of domestic wastewater, sludge disposal.

Air Pollution: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Noise Pollution: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

Transportation Engineering

Transportation Infrastructure: Highway alignment and engineering surveys; Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments; Geometric design of railway track; Airport runway length, taxiway and exit taxiway design.

Highway Pavements: Highway materials - desirable properties and quality control tests; Design of bituminous paving mixes; Design factors for flexible and rigid pavements; Design of flexible pavement using IRC: 37-2012; Design of rigid pavements using IRC: 58-2011; Distresses in concrete pavements.

Traffic Engineering: Traffic studies on flow, speed, travel time - delay and O-D study, PCU, peak hour factor, parking study, accident study and analysis, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Control devices, signal design by Webster's method; Types of intersections and channelization; Highway capacity and level of service of rural highways and urban roads.

Geomatics Engineering

Principles of surveying; Errors and their adjustment; Maps - scale, coordinate system; Distance and angle measurement - Levelling and trigonometric levelling; Traversing and

triangulation survey; Total station; Horizontal and vertical curves. Photogrammetry - scale, flying height; Remote sensing - basics, platform and sensors, visual image interpretation; Basics of Geographical information system (GIS) and Geographical Positioning system (GPS).

E02: ASSISTANT MANAGER – ELECTRICAL

Electric Circuits: Network graph, KCL, KVL, Node and Mesh analysis, Transient response of dc and ac networks, Sinusoidal steady-state analysis, Resonance, Passive filters, Ideal current and voltage sources, Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Two-port networks, Three phase circuits, Power and power factor in ac circuits.

Electromagnetic Fields: Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions, Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl, Faraday's law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.

Signals and Systems: Representation of continuous and discrete-time signals, Shifting and scaling operations, Linear Time-Invariant and Causal systems, Fourier series representation of continuous periodic signals, Sampling theorem, Applications of Fourier Transform, Laplace Transform and z-Transform.

Electrical Machines: Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency; Three phase transformers: connections, parallel operation; Auto-transformer, Electromechanical energy conversion principles, DC machines: separately excited, series and shunt, motoring and generating mode of operation and their characteristics, starting and speed control of dc motors; Three phase induction motors: principle of operation, types, performance, torque-speed characteristics, no-load and blocked rotor tests, equivalent circuit, starting and speed control; Operating principle of single phase induction motors; Synchronous machines: cylindrical and salient pole machines, performance, regulation and parallel operation of generators, starting of synchronous motor, characteristics; Types of losses and efficiency calculations of electric machines.

Power Systems: Power generation concepts, ac and dc transmission concepts, Models and performance of transmission lines and cables, Series and shunt compensation, Electric field distribution and insulators, Distribution systems, Per-unit quantities, Bus admittance matrix, Gauss-Seidel and Newton-Raphson load flow methods, Voltage and Frequency control, Power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential and distance protection; Circuit breakers, System stability concepts, Equal area criterion.

Control Systems: Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs, Transient and Steady-state analysis of linear time-

invariant systems, Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Stability analysis, Lag, Lead and Lead-Lag compensators; P, PI and PID controllers; State space model, State transition matrix.

Electrical and Electronic Measurements: Bridges and Potentiometers, Measurement of voltage, current, power, energy and power factor; Instrument transformers, Digital voltmeters and multimeters, Phase, Time and Frequency measurement; Oscilloscopes, Error analysis.

Analog and Digital Electronics: Characteristics of diodes, BJT, MOSFET; Simple diode circuits: clipping, clamping, rectifiers;

Amplifiers: Biasing, Equivalent circuit, and Frequency response; Oscillators and Feedback amplifiers; Operational amplifiers: Characteristics and applications; Simple active filters,

VCOs and Timers, Combinational and Sequential logic circuits, Multiplexer, Demultiplexer, Schmitt trigger, Sample and hold circuits, A/D and D/A converters, 8085 Microprocessor: Architecture, Programming and Interfacing.

Power Electronics: Characteristics of semiconductor power devices: Diode, Thyristor, Triac, GTO, MOSFET, IGBT; DC to DC conversion: Buck, Boost and Buck-Boost converters; Single and three phase configuration of uncontrolled rectifiers, Line commutated thyristor-based converters, Bidirectional ac to dc voltage source converters, Issues of line current harmonics, Power factor, Distortion factor of ac to dc converters, Single phase and three phase inverters, Sinusoidal pulse width modulation.

E03: ASSISTANT MANAGER(S&T)_Electronics or Electronics & Communication

Networks, Signals and Systems

Network solution methods: nodal and mesh analysis; Network theorems: superposition, Thevenin and Norton's, maximum power transfer; Wye-Delta transformation; Steady state sinusoidal analysis using phasors; Time domain analysis of simple linear circuits; Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits; Linear 2-port network parameters: driving point and transfer functions; State equations for networks. Continuous-time signals: Fourier series and Fourier transform representations, sampling theorem and applications; Discrete-time signals: discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, interpolation of discrete-time signals; LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay, digital filter design techniques.

Electronic Devices

Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations; P-N junction, Zener diode, BJT, MOS capacitor, MOSFET, LED, photo diode and solar cell; Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process.

Analog Circuits

Small signal equivalent circuits of diodes, BJTs and MOSFETs; Simple diode circuits: clipping, clamping and rectifiers; Single-stage BJT and MOSFET amplifiers: biasing, bias stability, mid-frequency small signal analysis and frequency response; BJT and MOSFET amplifiers: multi-stage, differential, feedback, power and operational; Simple op-amp circuits; Active filters; Sinusoidal oscillators: criterion for oscillation, single-transistor and opamp configurations; Function generators, wave-shaping circuits and 555 timers; Voltage reference circuits; Power supplies: ripple removal and regulation

Digital Circuits

Number systems; Combinatorial circuits: Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers and finite state machines; Data converters: sample and hold circuits, ADCs and DACs; Semiconductor memories: ROM, SRAM, DRAM; 8-bit microprocessor (8085): architecture, programming, memory and I/O interfacing.

Control Systems

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems

Communications

Random processes: autocorrelation and power spectral density, properties of white noise, filtering of random signals through LTI systems; Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, superheterodyne receivers, circuits for analog communications; Information theory: entropy, mutual information and channel capacity theorem; Digital communications: PCM, DPCM, digital modulation schemes, amplitude, phase and frequency shift keying (ASK, PSK, FSK), QAM, MAP and ML decoding, matched filter receiver, calculation of bandwidth, SNR and BER for digital modulation; Fundamentals of error correction, Hamming codes; Timing and frequency synchronization, inter-symbol interference and its mitigation; Basics of TDMA, FDMA and CDMA.

Electromagnetics

Electrostatics; Maxwell's equations: differential and integral forms and their interpretation, boundary conditions, wave equation, Poynting vector; Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth; Transmission lines: equations, characteristic impedance, impedance matching, impedance transformation, S-parameters, Smith chart; Waveguides: modes, boundary conditions, cut-off frequencies, dispersion relations; Antennas: antenna types, radiation

pattern, gain and directivity, return loss, antenna arrays; Basics of radar; Light propagation in optical fibers.

E04 : ASSISTANT MANAGER(ACCOUNTS)

Financial Accounting

Accounting – Basics , Fundamentals of Accounting , Accounting for Special Transactions , Preparation of Financial Statements, Preparation of Final Accounts of Profit Oriented organizations, Non-Profit Organizations and from Incomplete Records., Partnership Accounts , Self Balancing Ledgers, Royalties, Hire Purchase & Installment System, Branch & Departmental Accounts, Accounting Standards etc

Accounting in Computerized Environment

Financial Reporting

GAAP and Accounting Standards

Ind AS 101 – First-time Adoption of Indian Accounting Standards, Ind AS 110 – Consolidated Financial Statements, Ind AS 1 – Presentation of Financial Statements, Ind AS 2 – Inventories, Ind AS 7 – Statement of Cash Flows, Ind AS 8 – Accounting Policies, Changes in Accounting Estimates and Errors, Ind AS 10 – Events after the Reporting Period, Ind AS 12 – Income Taxes, Ind AS 16 – Property, Plant and Equipment, Ind AS 17 – Leases, Ind AS 19 – Employee Benefits, Ind AS 20 – Accounting for Gov. Grants and Disclosure of Govt. Assistance, Ind AS 21 – The Effects of Changes in Foreign Exchange Rates, Ind AS 23 – Borrowing Costs, Ind AS 24 – Related Party Disclosures, Ind AS 27 – Separate Financial Statements, Ind AS 28 – Investments in Associates and Joint Ventures, Ind AS 33 – Earnings per Share, Ind AS 34 – Interim Financial Reporting, Ind AS 36 – Impairment of Assets, Ind AS 37 – Provisions, Contingent Liabilities and Contingent Assets, Ind AS 38 – Intangible Assets, Ind AS 40 – Investment Property, Ind AS 11 – Construction Contracts, Ind AS 18 – Revenue, etc.

Accounting of Business combinations and restructuring,

Consolidated Financial Statement (Ind AS),

Developments in Financial Reporting and other item of Reporting,

Cost & Management 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, Decision Making techniques- Relevant Cost analysis, Profitability analysis, Transfer Pricing, Activity based costing-JIT and ERP, Total quality management.

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, Security analysis , Portfolio management, Financial risk management-Risk and derivatives.

Direct Tax Laws

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.

Indirect Tax Laws

GST (Goods and Services Tax Act & Rules):-Introduction, Levy and Collection of Tax, Classification of Goods and Services- Reading the Rate Schedule, Time of Supply , Value of Supply , Place of Supply , Input Tax Credit, Registration ,Tax Invoice, Credit and Debit Notes , Accounts, Other Records under GST, Payment of Tax, TDS & TCS under GST, Returns , Matching Concept , Exports, Imports and Refunds under GST, Assessments, Inspection, Search & Seizure, Audit under GST, Job Work Under GST, E _Waybills under GST, Anti-profiteering etc.

Customs Law and procedures:-Basic Concepts , Classification under Customs, Types of Duties, Valuation under Customs, Import and Export Procedure, Warehousing, Duty Drawback, Baggage & Postal Articles etc.

Corporate Laws and Compliance

The Companies Act, 2013, SEBI and regulations, Competition Act 2002, Foreign exchange management act 1999, Corporate governance etc.

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

Business Laws, Ethics & Communication

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.

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

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

E05: ASSISTANT MANAGER - HR

Strategic Human Resource Management

- Aligning HR with Corporate Strategy
- Competencies of HR Professional
- Contingency and Configurational Approaches in Strategic Human Resource Management
- Corporate Ethics and Values
- Corporate Strategy and Career Systems
- Effectiveness of SHRM
- Global Environment of HR: Change & Diversity
- Managing Employee Relations
- Managing Human Resources inflow
- Performance Management
- Strategic HR Planning Acquisition and Development
- Manpower Planning

Industrial Relations

- Various approaches in Industrial Relations
- Trade Unions
- Trade Unionism in India
- Contemporary Issues in Industrial Relations
- Employers Associations
- Industrial Relations in the emerging scenario
- The Indian IR framework
- Trade Union politics
- Trade Union recognition and registration

Training and Development

- Human Resource Development
- Incorporating Learning Principles in Programme Design
- Needs Assessment
- Objective Setting
- Strategy and Training
- Systematic Approach to Training
- Training Department and Trainers' Roles
- Training Evaluation

E05: ASSISTANT MANAGER - HR

- Training Trends Worldwide
- Leadership, Organizational behavior , Team Building , HR Analytics

Selection

- Job Analysis in Human Resource Planning
- Recruitment, Selection and Interview
- Selection in New Type of Organizations

Labour Legislations

- Social Security Legislation
- Labour Welfare Legislation
- Participative Management
- Philosophy of Participation
- Forms and Levels of Participation
- Perspectives on Participation
- Problems in Developing Participation

Compensation Management

- Compensation design
- Fringe benefits
- Incentives
- Reward Management & Performance Management System
- Wage & Salary Administration
- Right to Information Act, 2005 & amendment from time to time
- Minimum wage Act , 1948
- Provident Fund Act , 1952
- Payment of Gratuity Act , 1972
- Factory Act , 1948
- Industrial Dispute Act , 1947
- Standing Order Act , 1946
- Contract Labour (Regulation and abolition Act) ,1970
- Workmen compensation Act, 1923

E06: ASSISTANT Manager- Public Relations

Unit – I

- Communication and Journalism – Basic terms, Concepts and definition, Nature and Process.
- Types of Communication.
- Mass Communication – Nature of Media and Content.
- Mass Communication in India – Reach, access and Nature of Audience.

Unit – II

- Role of Media in Society.
- Characteristics of Indian Society – Demographic and Sociological impact of media in general.
- Impact of media on specific audiences – Women, children, etc.
- Mass media effects studies and their limitations.
- Mass campaigns for specific issues – Social concerns, environment, human rights, gender equality.
- The press, radio, television, cinema and traditional form of communication.
- Print, electronics journalism – Demand, Challenges and responsibility
- Public Relations, Advertising, Cinema – Contemporary analysis

Unit – III

- Journalism as a Profession.
- Journalists – Their role and responsibilities.
- Indian Constitution and freedom of press.
- Research Restrictions.
- Ethics and Journalism.
- Careers in Journalism and Mass Media.
- Training – Problems, perception and response by the industry Media management – Principles and practices.
- Professional organizations in Media
- Media Laws in India.
- Media Relations and management
- Press – Releases – Types and usages
- Media Campaigns – Digital and traditional
- Fairs and Exhibitions
- Advertising – Ad copy, layout, tender, advertisement, television, radio, social media advertising
- Public speaking and presentation
- Right to Information Act, 2005 & amendment from time to time

- Writing Proficiency (in English and Hindi) – Press Release, Statements, articles, speeches, talking points etc.

Unit – IV

- History of Print and Broadcast media in general with particular reference to India.
- Post – independent developments in print.
- Newspapers – English and Indian language press – major landmarks.
- Magazines – Their role, bookphase and contemporary situation.
- Small newspapers – Problems and prospects.
- Press Commission, Press Councils – Their recommendations and status.
- Development of Radio after independence – Extension role, radio rural forums and local broadcasting – General and specific audience programs.
- Development of Television – Perception, initial development and experimental approach; SITE phase and evaluation; Expansion of television – Post – Asiad phase, issues concerns and debates over a period of time.
- Committees in broadcasting – Background, recommendations and implementation.
- Cinema – Historical overview and contemporary analysis – Commercial, parallel and documentary genres – Problems and prospects for the film industry.
- Social Media – Account Management and Maintenance
- Mobile Applications – as a tool communication
- New trends in Audio visual production
- FM, Community, Web, Digital and other forms of Radio.

Unit – V

- Communication and theories of social change.
- Role of media in social change – Dominant paradigms.
- Critique of the Dominant paradigm and alternative conception.
- Development initiatives – State, market and the third force (NGO sector).
- Participatory approaches and community media – Ownership and management perspectives.

Unit – VI

- Introduction of research methods and process
- Mass communication research – Historical overview
- Administrative and critical traditions
- Effects research – Strengths and Limitations.
- Communication research in India – Landmark studies related to SITE.
- Content analysis – Quantitative and qualitative approaches.
- Market research and its relationship to Communication particularly advertising.
- Sampling techniques – Strengths and Limitations.
- Statistical methods of analysis basics.

Unit – VII

- Colonial Structures of Communication.

- Decolonization and aspirations of nations.
- Conflicts related to media coverage and representation.
- International news agencies – Critique.
- MacBride Commission – Recommendations and policy options.
- Contemporary issues related to transnational broadcasting and its impact on culture, various perspectives and cultural impact.
- Convergence of media – Problems and options.
- Media Policies in an International Context.
- India's position and approach to international communication issues.

Unit – VIII

- Radio & TV and Video as Media of Communication.
- Grammar of TV & Radio and Video.
- The Production Team.
- Role of Producer.
- Different Types of Programs:
- Writing for Radio
- Writing for TV – Researching for Scripts
- The Visual Language
- Camera Movements
- Basic Theories of Composition – Cues and Commands.
- Formats for Radio – Television – News, Sitcoms, Features, Commercials, Operas, Documentaries, Cinema, Theatre, Drama.
- Editing Theory and Practice.
- Sound Design, Microphones, Sets and Lighting.
- Satellite, Cable television, Computers, Microchips.

Unit – IX

- Advertising.
- Marketing.
- Ad copy and Layout.
- Public Relations.
- Public Opinion.
- Propaganda.

Unit – X

- The Techniques.
- Different forms of writing.
- Printing Technology and Production methods.
- News agencies.
- Syndicates and Freelancing.
- Specialized areas of Journalism.

NE01: Jr. Engineer (Civil Engineering)

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 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, Flow 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.

NE02: JE Electrical/Electrical & Electronics

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, Starting 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 relay Merz-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.

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

Non-Linear Control System : Introduction, behaviour of non-linear control system. Different types of nonlinearities, saturation, backlash, hysteresis, 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, Silver, 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 registers and counters.

NE03: 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.

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, hysteresis, dead zone, relay, friction, 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, Silver, 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 registers 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

NE04: Public Relations Assistant

Unit – I

Communication and Journalism – Basic terms, Concepts and definition, Nature and Process.

Types of Communication.

Mass Communication – Nature of Media and Content.

Mass Communication in India – Reach, access and Nature of Audience.

Unit – II

Role of Media in Society.

Characteristics of Indian Society – Demographic and Sociological impact of media in general.

Impact of media on specific audiences – Women, children, etc.

Mass media effects studies and their limitations.

Mass campaigns for specific issues – Social concerns, environment, human rights, gender equality.

The press, radio, television, cinema and traditional form of communication.

Unit – III

Journalism as a Profession.

Journalists – Their role and responsibilities.

Indian Constitution and freedom of press.

Research Restrictions.

Ethics and Journalism.

Careers in Journalism and Mass Media.

Training – Problems, perception and response by the industry Media management – Principles and practices.

Professional organisations in Media

Media Laws in India.

Unit – IV

History of Print and Broadcast media in general with particular reference to India.

Post – independent developments in print.

Newspapers – English and Indian language press – major landmarks.

Magazines – Their role, bookphase and contemporary situation.

Small newspapers – Problems and prospects.

Press Commission, Press Councils – Their recommendations and status.

Development of Radio after independence – Extension role, radio rural forums and local broadcasting – General and specific audience programs.

Development of Television – Perception, initial development and experimental approach; SITE phase and evaluation; Expansion of television – Post – Asiad phase, issues concerns and debates over a period of time.

Committees in broadcasting – Background, recommendations and implementation.

Cinema – Historical overview and contemporary analysis – Commercial, parallel and documentary genres – Problems and prospects for the film industry.

Unit – V

Communication and theories of social change.

Role of media in social change – Dominant paradigms.

Critique of the Dominant paradigm and alternative conception.

Development initiatives – State, market and the third force (NGO sector).

Participatory approaches and community media – Ownership and management perspectives.

Unit – VI

Introduction of research methods and process

Mass communication research – Historical overview

Administrative and critical traditions

Effects research – Strengths and Limitations.

Communication research in India – Landmark studies related to SITE.

Content analysis – Quantitative and qualitative approaches.

Market research and its relationship to Communication particularly advertising.

Sampling techniques – Strengths and Limitations.

Statistical methods of analysis basics.