SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
MANAGER (ERP-HR)
[POST CODE – (ERP 01)]

STRUCTURES IN HUMAN RESOURCES

- ENTERPRISE STRUCTURE
- COMPANY CODE, PERSONNEL AREA AND PERSONNEL SUBAREA AND
- COST CENTER
- PERSONNEL STRUCTURE
- EMPLOYEE GROUP AND EMPLOYEE SUBGROUP
- ORGANIZATION STRUCTURE
- ORGANIZATIONAL UNITS, JOBS AND POSITIONS
- PA-OM INTEGRATION POINTS

ORGANIZATIONAL MANAGEMENT

- INTEGRATION WITH OTHER MODULES
- OBJECTS IN OM
- EVALUATION PATH AND OBJECT

TIME MANAGEMENT

- IMPORTANT INFO TYPES IN TIME MANAGEMENT
- CONCEPTS OF POSITIVE AND NEGATIVE TIME RECORDING
- TIME MANAGEMENT STATUS AND IMPORTANT
- TIME MANAGEMENT RELATED FEATURES
- DAILY WORK SCHEDULES VARIANT AND DAILY WORK SCHEDULES RULE
- DAY TYPES AND RULES
- ABSENCE/ATTENDANCES
- COUNTING RULES, DEDUCTION RULES, BASE ENTITLEMENT RULES AND SELECTION RULES
- TIME EVALUATION PROCESS, SCHEMAS RULES, FUNCTIONS, AND OPERATIONS

PERSONNEL ADMINISTRATION

- CUSTOMIZING PROCEDURES
- INFO TYPE MENUS
- ACTIONS
- USER GROUP DEPENDENCY ON MENUS AND INFO GROUPS
- HIRING ACTION
- SEPARATION ACTION
- SET UP PERSONNEL ACTIONS
- UPDATE INFO TYPE 0302 WHEN EXECUTING AN ACTION/ ADDITIONAL ACTIONS
- USER GROUP DEPENDENCY ON MENUS AND INFO GROUPS

- DYNAMIC ACTIONS
- AD-HOC QUERY
- CUSTOMIZING USER INTERFACES
- INFO TYPE HEADERS
- TIME CONSTRAINTS 1, 2, 3, A, B & T

PAYROLL

- OVERVIEW OF STANDARD PAYROLL PROCESSES
- INDIAN SPECIFIC INFO TYPES (0580 TO 0591)
- PAYROLL AREA
- FEATURE ABKRS
- CONTROL RECORD
- PCRs AND CAP (PERSONNEL CALCULATION RULES & COLLECTIVE AGREEMENT PROVISION
- PAY SCALE STRUCTURE
- PAY SCALE TYPE
- PAY SCALE AREA
- PAY SCALE GROUPS AND PAY SCALE LEVELS
- FEATURE TARIFF
- BASIC PAY CONFIGURATION
- WAGE TYPE CREATION, WAGE TYPE PERMISSIBILITY, WAGE TYPE CHARACTERISTICS
- DIRECT EVALUATION/INDIRECT EVALUATION
- COUNTRY SPECIFIC PAYROLL DRIVERS AND PROGRAMS
- INFO TYPES 0003 PAYROLL STATUS (HOW TO LOCK A PERSON IN PAYROLL ETC)
- INFO TYPES REQUIRED TO RUN A PAYROLL
- ADDITIONAL PAYMENTS
- RECURRING PAYMENTS & DEDUCTION
- WAGETYPE REPORTER
- PAYROLL-FI/CO INTEGRATION POINTS

DATA STRUCTURES AND INFOTYPES

- OVERVIEW OF PERSONNEL ADMINISTRATION AND OM INFOTYPES
- CUSTOMER- SPECIFIC INFOTYPE

LOGICAL DATABASES PNP/PNPCE

- OVERVIEW OF LOGICAL DATABASE PNP/PNPCE
- REPORT CATEGORIES

FUNCTION MODULES/BADIS/EXITS/ENHANCEMENTS

- OVERVIEW OF FUNCTION MODULES/BADIS/EXITS/ENHANCEMENTS

REPETITIVE STRUCTURES AND LIST DISPLAY

- INFOTYPES WITH REPETITIVE STRUCTURES
- LIST DISPLAY WITH ABAP LIST VIEWER

CLUSTER DATABASE TABLES IN HCM

- DATABASE TABLES
- PAYROLL RESULTS

UI5 AND FIORI

- BASIC OVERVIEW OF UI5 AND FIORI

MISCELLANEOUS

- OVERVIEW OF ESS/ MSS
- OVERVIEW OF HR RENEWALS

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SUPERINTENDING ENGINEER (ENVIRONMENT)
[POST CODE – (ENV 02)]

1. Engineering & Environmental Surveying
2. Environmental Chemistry & Microbiology
3. Geotechnical Engineering
4. Engineering Economics
5. Water Engineering: Design & Application, Wastewater treatment
6. Engineering Geology,
7. GIS & Remote Sensing
8. Waste Water Engineering:
9. Design and Applications
10. Instrumentation Techniques for Environmental Monitoring
11. Solid Waste Management
12. Air Pollution & Control
13. Hydrology & Ground Water Engineering
14. Vibration Analysis & Control of Noise Pollution
15. Industrial Waste Management including Hazardous waste, E waste, Bio medical waste
16. Climate Change & CDM
17. Soil contamination & remediation
18. Environmental Impact Assessment & Audit
19. System simulation & modelling
20. Environmental Law and Policy

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SUPERINTENDING MEDICAL OFFICER (RADIOLOGY)
[POST CODE – (MD 03)]

1. Radiation Physics
2. Ultrasound Physics
3. MRI Physics
4. Clinical applications of MRI
5. Radiologic anatomy of the whole body
6. Radiologic features of different diseases pertaining to various organs of the body
7. Radiologic interventions
8. Recent advances in Radiology

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SUPERINTENDING MEDICAL OFFICER (PAEDIATRICS)
[POST CODE – (MD 04)]

1. Neonatology
2. Growth & Developmental
3. Emergency care of children
4. ICU management of paediatric patients
5. Community paediatrics
6. General paediatrics
7. COVID special reference MIS-C

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR MEDICAL OFFICER
[POST CODE – (MD 05)]

MEDICINE

1. Nutritional and Metabolic disorders
2. Water, Electrolyte and Acid-Base imbalance
3. Critical Care Medicine: Shock, Respiratory failure, Renal failure, Coma, Sepsis, DIC
4. Poisoning: Chemicals and Pesticides, Snake bite and envenomation, bites by scorpion/ spider
5. Specific Occupational and Environmental Hazards
6. Infectious Diseases
7. Cardiovascular System: Chest pain, Atrial Fibrillation, CCF, Rheumatic Heart Disease, Ischaemic Heart Disease, Hypertension , Atherosclerosis.
8. Respiratory Diseases: Cough, Dyspnoea, Haemoptysis, Respiratory Failure, RTI, Br. Asthma, COPD, Pulmonary Tuberculosis, Suppurative Lung Diseases
9. Occupational Lung Diseases
10. Nephrology: UTI, Haematuria, ARF, CRF, Glomerulonephritides
11. GIT: Diseases of the mouth, esophagus (Eg. GERD), stomach (Eg. Gastritis, PUD, Tumors) and duodenum, small intestine, colon and rectum
12. Pancreas: Acute and Chronic Pancreatitis
13. Liver and Biliary Tract disease: Jaundice, PHF, Portal HTN and ascites, Hepatic Encephalopathy, Hepatorenal failure, Liver abscess, Viral Hepatitis, Alcoholic Liver Disease
14. Endocrinology and Metabolism : Type 2 Diabetes mellitus, Thyroid Disorders
15. Haematology: Anaemias, Myeloproliferative Disorders, Blood products and transfusion , Haematological Malignancies
16. Disorders of Immune system, Connective Tissue and Joints: HIV, AIDS, Osteoarthritis, Sarcoidosis, Amyloidosis, Systematic Connective Tissue disorders like SLE, RA
17. Neurology: Headache, CVA, Seizure disorders, Meningitis, Viral Encephalitis, Peripheral Neuropathy, Parkinsons' Disease

SURGERY

1. SKIN: Ulcers and Wounds, Burns, Skin infections (Boils, Carbuncles, abscess), cysts, skin tumours
2. ESOPHAGUS: Dysphagia, reflux, Hiatus Hernia, Tumours
3. BREAST: Fibroadenoma, Breast abscess, Carcinoma breast
4. STOMACH AND DUDENUM: Peptic Ulcer, Carcinoms stomach, gastritis
5. SMALL INTESTINE: Small bowel obstruction, Intestinal Tuberculosis
6. Acute appendicitis
7. ANUS: Haemorrhoids, Fissure-in-ano, Anorectal abscess
8. Biliary tract: Gall stone Disease
9. Pancreas: Acute Pancreatitis
10. Acute abdomen
11. Hernia
12. Common urological disorders; Calculi, Hydrocoele, Epididymo-orchitis

OBSTETRICS AND GYNAECOLOGY

1. Physiology of pregnancy
2. Diagnosis of pregnancy
3. Routine antenatal care
4. Management of common symptoms of pregnancy
5. Hypertensive disorders of pregnancy
6. Anaemia of pregnancy
7. Ante partum haemorrhage
8. IUGR
9. Rh –ve pregnancy
10. Puerperium and its complications
11. Menstrual cycle and common menstrual disorders
12. Fibroid uterus
13. Precancerous lesions of the female genital tract
14. Carcinoma cervix, endometrium and ovary
15. Contraception
16. Menopause and related problems

PAEDIATRICS AND NEONATOLOGY

1. Care of the newborn
2. Neonatal resuscitation
3. Detection of neonatal malformations
4. Neonatal sepsis
5. Neonatal Hyperbilirubinaemia
6. Management of common neonatal problems
7. Immunization
8. Growth and Development
9. Nutrition

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR OFFICER (CIVIL)
[POST CODE – (CE 07)]

1. Knowledge of Scales, Units & Measurements used in Civil Engineering
2. Building Materials including important Construction Chemicals e.g. Admixtures, Grouts, Epoxy, Carbon fibre wrapping etc.
3. Geotechnical Engineering
4. RCC/Steel Structural Design -Beam, Column, Slab, Isolated/Combined footing, Staircase, Water Tank.
5. Transportation Engineering -Design of pavements/IRC guidelines/Rigid & flexible pavement)
6. Knowledge on RCC/Steel bridges (span upto 20 Mtrs), Culverts, basics of well/pile foundations
7. Theory of Structure-basics of SFD/BMD/Truss Analysis/ILD/Deflections etc.)
8. Basics of Strength of Materials -elongation, modulus of elasticity, stress-strain curve, Poissons ratio etc.)
9. Estimation & Costing –Roads, Bridges, Culverts, Water Tanks, Industrial/Residential buildings.
10. Knowledge on preparation of Technical Specifications, BOQs, Bar Bending Schedules (ductile detailing)
11. Knowledge of Schedule of Rates- CPWD, Assam PWD/Arunachal PWD
12. Basics of Surveying & Levelling (Dumpy Level, Theodolite, Total Station, GPS etc.)
13. Concrete Technology -Mix designs, important laboratory tests of Cement, Steel, Aggregates & Concrete.
14. Water Supply and Sanitation Engineering e.g. Pipe fittings, able to estimate Water Supply demand in buildings, Sanitary fittings etc.
15. Environmental/Public Health Engineering like basics of Environmental protection law, eco-restoration measures, solid waste management, effluent treatments, knowledge on designing of manhole, junction box, septic tanks etc.
16. Construction Safety measures
17. Project Planning, CPM, Gantt chart
18. Contract Management
19. Knowledge of Construction Machinery-Road Rollers, Excavator, Hot Mix plant, Tar Boiler, Water Sprinkler, Concrete Pumps, Asphalt Compactor, Asphalt Paver, Concrete Batching plant, Transit Mixer, Motor grader, Vibratory Soil Compactor, Concrete Mixers etc.)
20. Knowledge of relevant IS codes (e.g. IS 456, IS 800, IS 1893 etc.)

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR OFFICER (ELECTRICAL)
[POST CODE – (EE 08)]

SN	Topic	Description
1	**Circuits And Networks**	Circuits and Networks, Two port network, Magnetically coupled circuit, Graph Theory, Application of Laplace Transform, Frequency Response, Fourier Analysis, Filter Circuits, Toport Network
2	**Electromagnetic Field Theory**	Vector Analysis, Electrostatics, Magnetostatics, Electromagnetic field, Materials and fields, Electromagnetic waves
3	**Analog Electronics**	Review of PN junction diode, Linear Wave Shaping, Bipolar Junction Transistor, MOSFET, BJT configuration, Multi-stage Transistor Amplifiers, Operational Amplifiers, Introduction to Feedback Amplifiers
4	**Electrical Measurement And Measuring Instruments**	Introduction, Galvanometers and dynamics, Magnetic measurements, Bridges for measurements, Potentiometers, Measurement of power, power factor and energy
5	**Power System-I**	Introduction to Power Plants, Economics of Power Systems, Transmission Systems, Distribution Systems, Line Constants, Mechanical Design, Underground Cables
6	**Signals And Systems**	Introduction to signals and systems, Introduction to system, Representation of signals, Statistical Signal Analysis
7	**Electrical Machines-I**	Constructional features, Electric circuit, Insulation system, Cooling circuit, Supporting structure, Magneto-motive force, Electromotive Force, DC Generators, DC Motors, Transformer, Polyphase Induction Motor, Linear Induction Motors
8	**Digital Electronics**	Logic Families and Logic Gates, Number Systems and Codes, Sequential Logic Circuits, Combinational Logics, Semiconductor Memories, Introduction to ADCs
9	**Electrical Machines -II**	Synchronous Machines, Synchronous motors, Solid state slip power recovery schemes for induction motor, Single phase commutator motors, Single phase Induction Motors, Stepper Motor

10	**Control System-I**	Motivation, Models and physical systems, Time domain analysis, Root locus analysis, Frequency domain analysis, Controller/ Compensator Design, Compensator design.
11	**Power System-II**	Performance of overhead transmission lines, Power system stability, Control of active and reactive power, Economic operation of steam Power plant, Elements of Hydrothermal co-ordination, Transients in power systems
12	**Microprocessor And Microcontroller**	Introduction, Microprocessor architecture, Programming microprocessors, Memory interfacing, Data transfer techniques and their implementation, Microcontrollers, Common peripherals and their interfacing, Important features of some advanced microprocessor, Applications of Microprocessors
13	**Control System-II**	Introduction to Digital Control, State Space Representation of Continuous Time and Discrete time systems, Introduction to nonlinear feedback control systems
14	**Power Electronics**	Introduction, Device characteristics, protection and operation, Phase controlled rectifiers, Choppers, Inverters, AC Voltage Controller, Cyclo converters, Applications
15	**Switchgear And Industrial Protection**	Symmetrical Fault Analysis, Symmetrical components and Unsymmetrical Fault Analysis, Neutral Grounding, Circuit Breakers, Protective Relays, Sub-Stations, Lightning Arrester
16	**Programming And Data Structure**	Introduction to Programming, Linear Data Structures, Recursion, Non-linear Data Structure, Hashing, Sorting and Searching Algorithms, File Structures
17	**Instrumentation**	Introduction, Analytical Instrumentation, Transducers & sensors, Non-destructive testing equipment, Data transmission & telemetry, Fiber optical instrumentation, Related topics
18	**Digital Signal Processing**	Discrete-Time Signals & Systems, Transforms, Sampling, Transform Analysis of LTI System, Structures for Discrete-time Systems, Filter Design Techniques, Discrete Fourier Transforms, Efficient Computation of DFT, Multi-rate signal processing, VLSI implementation, Applications of Signal Processing
19	**Industrial Drives**	Introduction, Dynamics of Electrical Drives, Selection of Motor Power Rating, Starting, Electric Braking, Control of

		Electrical Drives, Control of DC Drives, Control of Induction Motor Drives, Industrial Applications
20	**Analog & Digital Communications**	Introduction, Representation of signals and systems, Continuous Wave modulation, Random Variables and Stochastic Process, Sampling and Pulse modulation, Digital Communication, Introduction to Information Theory
21	**High Voltage AC/DC**	Breakdown mechanism of gases, Liquid and solid materials, Electrical properties of high vacuum, Over voltage phenomenon & Insulation co-ordination, High voltage generation, Measurement of High voltage & currents, High voltage Equipment, High voltage Testing and testing techniques, Design, planning and layout of high voltage laboratory, Introduction to EHV. System & EHV lines
22	**Flexible AC Transmission System**	Concepts of reactive power support and voltage stability, compensation at a bus and over a line. Synchronous condenser, static var compensation, static phase shifter, thyristor controlled switched capacitor, STATCONs and DVRs, Unified Power Flow Controller, Inter-line Power Flow Controller. Reactive power balance over a network and optimization.
23	**High Power Semiconductor Devices**	Power semiconductor devices, Converter operation, D.C. line commutation, Frequency conversion
24	**Higher Control System**	Optimal Control, Adaptive Control, Self-tuning control, Model Reference adaptive systems (MRAS), Real Time System Design, Fault Detection and Diagnosis of Dynamical System, Hardware Redundancy, Analytical Redundancy, Design of Detector, Electronic Instrumentation System Design
25	**Electrical Engineering Materials**	Dielectrics, Behaviour of dielectrics in alternating fields, Magnetic Properties of materials, Conductors, Properties of Semiconductors, Conducting materials, Insulating materials
26	**Smart Grid**	Basic Power Systems, Renewable Generation, Power System Economics, Smart Grid, Smart Grid Communications, Demand Side Management, Wide Area Measurement, Security and Privacy

27	**Industrial Management**	Industrial Engineering, Project management, Management, Organization, Material management, Production planning and control, Quality Control, Plant maintenance, Human Resource management
28	**Computer Applications In Power System**	Elementary linear graph theory, Different methods of solution of Linear and non-linear algebraic equations: Central Computer Control and Protection
29	**Intelligent Algorithms For Power Systems**	Introduction to Artificial Neural Networks (ANNs), multilayer feed-forward networks, back-propagation training algorithm, radial basis function and recurrent networks. ANN based algorithms for load flow analysis, economic load dispatch, load forecasting, transient stability, and power system stabilizers. Introduction to genetic algorithms, Application of genetic algorithms for power system optimization.
30	**Advanced Power Electronics And Devices**	Resonant DC – DC converters: operation, characteristics, design equations, control techniques and application; SMPS: Forward, fly back, push pull operation, characteristics, design and control techniques; Current controlled PWM; Voltage source inverters – Bang-bang, SPWM and space vector modulation techniques; Resonant DC link voltage source inverters – operation characteristics, design and control; Non drive applications of power electronic inverters: UPS, induction heating, metal cutting, active power line conditioning; Drive application of inverters: Vector controlled and slip power controlled induction motor drive, self-controlled synchronous motor drive – constant power factor and constant margin angle control; Permanent magnet synchronous motor drive, stepper motor drive and switched reluctance motor drive; Application of microprocessor, PC and DSP in machine drives – example with DC motor drive.
31	**Power Electronic Control of AC Drives**	AC Machines for Drives, Control and Estimation of Induction Motor Drives, Vector or Field Oriented Control of Induction motor drives, Control and Estimation of synchronous motor drives, Brushless DC motor drives

32	**Advanced Engineering Mathematics**	Linear Algebra, Complex variable, Calculus, Vector Analysis, Linear Programming, Transform Calculus, PDE
33	**Integrated Circuits And VLSI Design**	MOS transistor (enhancement and depletion). Basic inverter in NMOS and CMOS technology, E/D logic. Gates in NMOS and CMOS technology. Pass transistor. Introduction to NMOS and CMOS design methodology. Design rules, stick diagrams, poly-cell and gate array approaches. Examples of cell design. Software tools for design. Circuit and logic simulation. Layout generation and verification.
34	**Restructured Electrical Power System**	Overview of key issues in electric utilities restructuring, Open Access Same Time Information System, Tagging Electricity Transactions, Electric energy trading, Hedging tools for managing risk in electricity markets
35	**Electric Power Utilisation And Traction**	Traction System, Power Supply System for Track Electrification, Power Supply Arrangement, Overhead Equipment, Traction Mechanics and its applications, Electric Heating, Illumination
36	**Smart Sensors**	Smart sensors fundamentals, Smart sensors, Sensor networks architectures, Communication protocols, Energy management, Security, reliability and fault-tolerance, Sensor networks standards; platforms and tools
37	**Opto-Electronics And Fiber Optics**	Elements of Light And Solid State Physics, Display Devices and Lasers, Optical Detection Devices, Optoelectronic Modulator, Optoelectronic Integrated Circuits, Optical Fibers
38	**Renewable Energy Sources And Management**	Introduction, Solar Radiation, Low Temperature collectors, Applications of solar energy, Bioconversion, Wind energy, Other energy sources, Energy Management & Conservation
39	**Distribution System Planning And Automation**	Configuration of distribution systems, load characteristics, distribution transformers, distribution substation design, feeder design, voltage regulation, protection in distribution systems, SCADA, distribution automation.
40	**Demand Side Management**	The concepts of demand-side management (DSM) for electric utilities, DSM alternatives and goals. End-use equipment and control, utility equipment control, energy storage, dispersed generation, customer DSM promotions. Performance improvement equipment and system benefit/cost analysis of DSM alternatives: issues in

		forecasting DSM programme impacts. Implementation of DSM programme: pricing and incentives.
41	**Advance Electrical Machines**	Elements of Generalized Theory, Linear Transformation in Machines, D.C. Machines - Transient & Dynamic Performance, Transfer & Function, Poly-phase Synchronous Machines, Poly-phase Induction Machines, Fractional Kilowatt Motors
42	**Modelling And Simulation**	System Models and Role of Simulation, Statistical Tool, Discrete Event Simulation, Modelling and Performance Evaluation of Computer Systems, Continuous System Simulation, Virtual Reality Modelling, Verification and Validation of Simulation Models
43	**Illumination Technology**	Radiation, colour, eye & vision; Different entities of illuminating systems; Light sources; incandescent, electric discharge, fluorescent, arc lamps and lasers; Luminaries and light guides, control of light, control circuitry and computer based lighting control. Laws of illumination; illumination from point, line and surface sources. Photometry and spectrophotometry; Photocells. Environment and glare. General illumination design. Interior lighting-industrial, residential, office departmental stores, indoor stadium, theatre and hospitals. Exterior lighting - flood street, aviation and transport lighting, lighting for displays and signalling-neon signs, LED-LCD displays beacons and lighting for surveillance.
44	**Power Qualities**	Overview and definition of power quality PQ). Sources of pollution. International power quality standards, and regulations, Power quality problems: rapid voltage fluctuations, voltage unbalance, voltage and voltage swells, short duration outages. Power system harmonics: harmonic analysis, harmonic sources – static converters, transformer magnetization and non-linarites, rotating machines, arc furnaces, fluorescent lighting. Harmonic effects within the power system, interference with communication. Harmonic measurements. Harmonic elimination - harmonic filters.
45	**Reliability And Maintainability Engineering**	Basic reliability model, Constant failure rate model, Time dependent failure models, Reliability of systems, State-Dependent Systems, Physical reliability models, Design of

		reliability, Maintainability, Design of Maintainability, Availability
46	**Foundation In Optimization Methods**	Introduction, Classical Optimization Techniques, Linear Programming, Non linear Programming, Constrained Optimization, Integer Programming. Non traditional Optimization Algorithm
47	**Biomedical Engineering**	Introduction to Biomedical Instrumentation, Cardio-vascular System and Electrocardiography, Biomedical recorders, Implantable Bio-electric devices, Patient Care and monitoring, Biotelemetry, Medical Imaging, Computers in Biomedical Instrumentation, Related topics
48	**Hydro-Electric Engineering**	Essential Features of Hydro-Electric Power Plant. Classification of Hydro-Electric Power Plants. Hydrology, Hydrologic Cycle, Hydrograph, Flow duration curve. Size of plant and choice of units. Types of Turbine and their characteristics. Design of Main Dimensions of turbines. Draft tubes, types, setting and preliminary dimensions. Pumped storage schemes. Mini and Micro Hydro Power Plants. Selection of turbine and pump capacities, Pumping schedule. Operation and efficiency of Pumped storage schemes. Cost evaluation of hydro-electric plant. Co-ordination of different types of Power Plant in power system. Economic loading of hydro-power plants. Hydro-thermal mix. Types of Underground Power Plants. Largest Underground Power Plant. Elementary idea of the use of computers in power stations. Load dispatching. Power system security. Load forecasting. Generation allocation control. Generation system reliability
49	**Soft Computing Techniques And Applications.**	Introduction to soft computing, intelligent decision system, overview of soft computing techniques. Introduction to genetic algorithm, genetic operators and parameters, genetic algorithms in problem solving, theoretical foundations of genetic algorithms, evolutionary programming, particle swarm optimization, differential evolution; implementation issues and applications. Neural model and network architectures, perceptron learning, supervised hebbian learning, backpropagation,

		associative learning, competitive networks, hopfield network, computing with neural nets and applications of neural network. case-based reasoning (CBR), applications of CBR. Introduction to fuzzy sets, operations on fuzzy sets, fuzzy relations, fuzzy measures, applications of fuzzy set theory to different branches of science and engineering.
50	**Database Management System**	Introduction, Entity-Relationship Model, Relational Model, SQL and Integrity Constraints, Relational Database Design, Internals of RDBMS, File Organization & Index Structures
51	**EHV Transmission**	Introduction to EHV AC Transmission, Calculation of line & Ground parameters, Voltage gradient of conductors, Corona Effect – 1, Corona effect - 2 (Radio interference), Electrostatic field of EHV lines, DC Power Transmission Technology, Thyristor Valves, Analysis of HVDC converters, Converter & HVDC System Control
52	**Computer Organisation And Architecture**	Introduction, Processor Design, Controller Design, Memory Organization, Input – Output Processing, Peripheral System, Introduction to Operating System
53	**Intelligent And Knowledge Based Systems**	Problem solving: state space representation, problem reduction, constraint satisfaction networks. Heuristics. Knowledge Representation, Predicate calculus, resolution-refutation, Prolog. Rule based systems: forward and backward chaining. Handling of uncertainty: probabilistic techniques, fuzzy logic. Reasoning with incomplete information: non-monotonic reasoning. Elements of temporal logic. Diagnostic reasoning. Structured Knowledge Representation Schemes: Semantic networks, Frames, Inheritance and default reasoning. Expert Systems: Architecture of the expert systems. Expert system shells. Knowledge acquisition. Consistency of the knowledge base. Case studies. Distributed AI and agent based systems.
54	**Renewable Energy**	Introduction to Non-conventional energy sources, Solar Energy, Photovoltaic Energy Conversion, Wind Energy, Fuel Cell, Energy from bio-mass, Geo thermal Energy, Energy from the ocean, Magneto Hydro Dynamic Generation ,Combined Operation utilizing more than one source, composite systems

55	**Utilization & Conservation of Electrical Energy**	Electric Heating, Electric Welding, Electric traction, Energy Storage, Electrical Losses & Energy Conversion
56	**Digital Image Processing**	Human Visual System and Image perception, Image Transforms, Image enhancement, Spatial filtering, Image Restoration, Image Compression, Image Segmentation, Representation and Description, Applications of Digital Image Processing
57	**Reliability Engineering**	Introduction to Reliability Engineering, Reliability Mathematics, Concepts of Reliability, System Reliability Evaluation, Availability Analysis, Maintained Systems, Economics of Reliability Engineering

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR OFFICER (INSTRUMENTATION)
[POST CODE – (INS 09)]

1. MEASUREMENT

a) Basic measurement concept – Accuracy, linearity, repeatability, hysteresis, dead band, backlash, error.

b) Classification of Transducers: Resistive, Capacitive, Inductive transducers, Hall Effect sensors, magneto elastic transducers, solid state sensors, eddy current transducers, Piezo Electric transducers, photo electric transducers

c) Applications of Diaphragms, Bellows, Bourdon Tubes, Springs

d) Semiconductor sensors, sources and detectors, LED, laser, Photo-diode, photo-resistor and their characteristics, load cells, LVDT, gas sensors, density, viscosity, moisture and humidity measurements

e) Electrical and Electronics Measurements: Bridges and potentiometers, measurement of R, L and C. Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes. Extension of instrument ranges. Q-meter and waveform analyzer. Serial and parallel communication. Shielding and grounding.

2. INDUSTRIAL INSTRUMENTS

a) Temperature measurement: Thermocouple, Resistance Temperature Detector, Thermistor and its measuring circuits, Radiation pyrometers and thermal imaging.

b) Pressure measurement: Transmitter definition types, Mechanical, Electro-mechanical and electronic pressure measuring instruments. Manometers, Elastic types, Bell gauges, Bellows; Bourdon tubes; Vacuum measurement. Differential Pressure transmitters, Dead weight Pressure gauges. Low Pressure Measurement.

c) I/P and P/I Converters

d) Level measurement: Differential pressure level detectors, Displacement type Level Detectors, Capacitance level sensor, Ultrasonic level detectors and Radar level transmitters and gauges.

e) Flow measurement: Classification of flow meters, Head Type (Orifice), differential pressure and variable area flow meters, anemometers, Positive displacement flow meters, Electro Magnetic flow meters, Ultrasonic flow meters, vortex flow meters.

f) Measurement of mass flowrate - Radiation, angular momentum, impeller, turbine, constant torque hysteresis clutch, twin turbine, Coriolis, gyroscopic. Target flowmeters, V-cone flowmeters, Multiphase flow measurement

g) Pneumatic Instrumentation - Air filter, Pressure regulator, Servo valve, Relay, Amplifier, Controller

h) Recorders: Different types of recorders; Construction, working principle and circuit diagrams of Strip-chart & X-Y recorders

i) Miscellaneous measurement: Ammeter, Voltmeter, Digital Multimeter, Ohmmeter, Cathode Ray Oscilloscope, Vibration meters, pH meters, Dew Point Meters, Viscosity, Humidity & Density.

j) Different chromatography techniques – Gas chromatography – Detectors – Liquid chromatographs – Applications

k) Calibration of Instruments

l) Concept of live zero (4-20 mA and 3-15 psi)

3. CONTROL SYSTEM AND PROCESS CONTROL

a) Process & process control systems; Objectives & requirements; Classification & selection of process variables; Sources &nature of disturbances; Response of first and second order systems due to load change at arbitrary points with P, I, P-I and P-I-D controllers

b) On-off, cascade, P, I, P-I, P-ID, feed forward and derivative controller, Fuzzy controllers

c) Multi loop control systems: Cascade control, override control, split-range control, feedforward control and ratio control systems.

d) Controller tuning- Process reaction curve method, Ziegler Nichols method, Damped oscillation method, Two-point method, Multiloop Control-Feed forward, Ratio, Cascade, Inferential, Split range control, Internal Model Controller, Dead time Compensator.

e) Feedback principles. Signal flow graphs. Transient Response, steady-state-errors. Routh and Nyquist criteria. Bode plot, root loci. Time delay systems. Phase and gain margin. State space representation of systems.

f) Mechanical, hydraulic and pneumatic system components.

g) Control valve: Construction and working principle, valve sizing, valve plug, valve characteristics, valve positioners.

4. ANALOG ELECTRONICS

a) Characteristics of diode, BJT, JFET and MOSFET.

b) Diode circuits. Transistors at low and high frequencies, Amplifiers, single and multi-stage. Feedback amplifiers.

c) Rectifier Circuits: Single-phase half wave, 2-phase half wave, Single-phase bridge uncontrolled, fully control & half-controlled rectifiers; Transformer rating; Rectification with R-L & R-C loads; Power factor improvement.

d) Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

e) Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators.

f) Operational amplifiers, characteristics and circuit configurations. Instrumentation amplifier. Precision rectifier. V-to-I and I-to-V converter. Op-Amp based active filters. Oscillators and signal generators.

5. DIGITAL ELECTRONICS

a) Combinational logic circuits, minimization of Boolean functions. IC families, TTL, MOS and CMOS.

b) Boolean Algebra & Logic Functions; Boolean algebra; Boolean expressions; Truth table representation, AND, OR, NOT, NAND, NOR, XOR & XNOR gates and their truth tables; Implementation of Boolean functions using logic gates

c) Arithmetic circuits. Comparators, Sequential circuits, flip-flops, counters, shift registers. Multiplexer. Analog-to-Digital and Digital-to-Analog converters.

d) Basics of number system. General definitions of mini computers, microprocessors, micro controllers and digital signal processors, Microprocessor applications, memory and input-output interfacing. Microcontrollers.

e) Performance metrics of logic families, Binary codes, Multiplexers, De-multiplexers, Encoders, Decoders, Comparators, Parity generators and checker. Latches, flip-flops, Synchronous and Asynchronous circuits - Counters, Shift registers.

f) Integrated Circuit Logic Families - TTL, PMOS, NMOS, CMOS

g) Semiconductor memories: ROM, RAM.

h) Programmable Logic Devices – PROM, PLA, PAL, FPGA.

6. POWER SYSTEMS

a) Principle of operation of inverter; voltage driven inverter; current driven inverter.

b) A.C Voltage controller, ON-OFF control; Phase angle control; Single phase bi-directional controller.

c) Power supplies: D.C. power supply; Switching Mode Power Supply (SMPS), Bi-directional power supplies; A.C. power supplies; Uninterrupted Power Supply (UPS), Power factor conditioning.

d) Instrument Transformers: Uses of instrument transformers; Theory and Testing of Current Transformers & Potential Transformers.

e) Semiconductor power devices: Characteristics of power devices- Diode, Power transistor, Thyristor and TRIAC; Firing circuit for Thyristor & TRIAC; Rating, Cooling & mounting of Thyristor; Series & parallel connection of Thyristor; Protection of Thyristor; Gate trigger & commutation circuits; Gate Turn-Off Thyristor (GTO); power MOSFET; UJT; DIAC & IGBT.

f) Static V-I characteristics and firing/gating circuits for Thyristor, MOSFET, IGBT; DC to DC conversion; Single and three-phase configuration of uncontrolled rectifiers; Bidirectional ac to dc voltage source converters; Magnitude and Phase of line current harmonics for uncontrolled and thyristor-based converters; Power factor and Distortion Factor of ac to dc converters; Single-phase and three-phase voltage and current source inverters, sinusoidal pulse width modulation.

7. DATA TRANSMISSION AND COMMUNICATION

a) Communication engineering: Electromagnetic radiation, Need for modulation- AM, FM, PM

b) Noise in electronic circuits; capacitive & inductive coupling; shielding; co-axial & twisted pair cable; grounding.

c) Instrumentation Standard Protocols: HART Protocol structure and programming, Advantages and Limitations. Foundation Fieldbus structure, programming, Benefits, Advantages and Limitations, other fieldbus standards including Device Net, Profibus, ControlNet, CAN, Industrial Ethernet etc.

d) Data Communication: Goals and Applications of Networks, Wireless Network, Interfaces and services. Reference Models: The OSI reference model, TCP/IP reference model.

e) Data Networks: Data transmission in PSTN, switching techniques for data transmission, OSI reference model, Satellite based data networks, fiber optic networks, protocol stacks, internetworking. ISDN services, transmission channels and user network interface in ISDN, ISDN protocol architecture, ISDN standards, ISDN numbering and addressing. Introduction to the basic principles of frame relay, TCP/IP and ATM.

f) Wireless Communication protocols and Standards

8. INDUSTRIAL ADVANCED PROCESS CONTROL

a) Programmable logic controllers (PLC): Architecture, Discrete state process control, relay diagram, ladder diagram, ladder diagram examples, relay sequencers, timers/counters, PLC design, Study of industrial PLC. PLC Installation, troubleshooting and maintenance. Design of alarm and interlocks, networking of PLC.

b) Distributed Control Systems: Functions, advantages and limitations, DCS Architecture, specifications, configuration and programming, functions including database management, reporting, alarm management, communication, third party interface, control, display etc. Enhanced functions viz. Advance Process Control, Batch application, Historical Data Management, OPC support, Security and Access Control etc.

c) Interfacing Smart field devices (wired and wireless) with PLC and DCS.

d) SCADA architecture and uses, PLC interface to SCADA/DCS using communication links (RS232, RS485) and protocols (Modbus ASCII/RTU).

e) Principles & working of Gas turbine plants; Safety aspect in Power Plants.

f) Control for—boiler, condenser, steam heater, pumps, compressor, generator cooling system.

g) Turbine supervisory system for monitoring of Mechanical parameters--- speed, vibration, eccentricity etc; Turbine trip condition

9. INDUSTRIAL STANDARDS, SAFETY AND PROJECTS

a) Design: Functional requirements & specifications; NEMA, DIN, BSI, ANSI standards; Guidelines of enclosure design, cable design. Standards used in instrumentation project: ISA S5.1, S5.3, S5.4, S5.5 and S5.20, ANSI, & NFPA.

b) Selection and Application: Selection and application of temperature, pressure, flow and level measuring instruments.

c) Standards and Calibration: Calibration of temperature, pressure and flow measuring devices. Introduction to ISO, IEC and API standards pertaining to temperature, pressure and flow instrumentation.

d) EMI and EMC: Interference coupling mechanism, basics of circuit layout and grounding, concepts of interfaces, filtering and shielding.

e) Safety: Introduction, electrical hazards, hazardous areas and classification, non-hazardous areas, enclosures-NEMA types, fuses and circuit breakers. Protection methods: Purging, explosion proofing and intrinsic safety. ESD protection in equipment and Plants.

f) Specifications: Specification of instruments, preparation of project documentation, process flow sheet, instrument index sheet, instrument specifications sheet, panel drawing and specifications, instrument specifications.

g) Definition of project purpose—scope, time, quality, organizational structure; Basic & detailed engineering; Project S curves; Types of projects & Types of contracts. Project procedure, schedules, vendor drawing, tender documentation, selection of measurement method and control panels.

h) Program evaluation and review techniques (PERT) and Critical path method (CPM), S-curve concept and crash time concepts, software used in project management; software features, classification, evaluation and implementation.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR OFFICER (MECHANICAL)
[POST CODE – (ME 10)]

Theory of Machines:
Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope'.

Machine Design:
Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted' riveted and welded joints; shafts, gears, rolling and sliding contact bearings' brakes and clutches' springs.

Vibrations:
Free and forced vibration of single degree of freedom systems' effect of damping; vibration isolation; resonance; critical speeds of shafts'.

Engineering Mechanics:
Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions.
Mechanics of Materials: Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain, thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Eule/s theory of columns; energy methods; thermal stressesi strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

Engineering Materials:
Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.

Casting, Forming and Joining Processes: Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.

Machining and Machine Tool Operations:
Mechanics of machining; basic machine tools; single and multipoint cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, design of jigs and fixtures.

Metrology and lnspection:
Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

Production Planning and Control:
Production planning, scheduling, materials requirement planning.

Fluid Mechanics:
Fluid properties;fluid statics,manometry, buoyancy,forces on submerged bodies, stability of floating bodies; control-volume analysis of mass' momentum and energy; fluid acceleration;differential equations of continuity and momentum;
Bernoulli'sequation;dimensional analysis;viscous flow of incompressiblefluids, boundary layer, elementary turbulent flow, flow through pipes' head losses in pipes, bends and fittings, Different types of pumps.

Thermodynamics:
Thermodynamic systems and processes; properties of pure substances,
behavior of ideal and real gases zeroth law, and first laws of thermodynamics' calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations'.

Power Engineering:
Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat and I.C Engines: Air-standard Otto' Diesel and dual cycle, refrigeration and air conditioning: Vapour and gas refrigeration and heat pump properties of moist air, basic psychrometric processes'

Turbo machinery:
lmpulse and reaction principles' velocity diagrams' Pelton-wheel' Francis and Kaplan turbines.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR OFFICER (PUBLIC AFFAIRS)
[POST CODE – (PA 11)]

Mass Communication

1. Advertising
2. Public Relation
3. Writing for media
4. Crisis Communication
5. Corporate communication
6. Social Media
7. Media Management
8. Broadcast media: Television & Radio
9. Graphic design for media
10. Film appreciation and criticism
11. Communication for social change and development
12. Communication research methods
13. Television programme and production
14. New media production
15. Documentary production
16. Media in Northeast India

Social Work

1. History and Ideologies of Social Work
2. Qualitative Research Methods in Social Work
3. Disasters, Impoverishment and Social Vulnerability
4. Social Welfare Administration
5. Social Policy, Planning and Programmes
6. Conflict, Violence and Collective Violence
7. Mental Health
8. Social Policy and Planning
9. Community Organisation
10. Social Action
11. Networking and Advocacy
12. Global Economy and Polity
13. Sustainable Development and Gender

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR ACCOUNTS OFFICER / SENIOR INTERNAL AUDITOR
[POST CODE – (AC 12)]

1. FINANCIAL ACCOUNTING & REPORTING

- Accounting Standards- Introduction and Overview, Carve outs/ins in Ind ASs vis-à-vis International Financial Reporting Standards (IFRSs), Preparation of Financial statements of Company viz. Cash flow Statement (Profit and Loss Account, Balance Sheet and Cash Flow Statement)- Profit/Loss prior to incorporation as per Schedule II of Companies Act.
- SEBI Regulations only related to financial matters excluding Secretarial issues.

2. COST AND MANAGING ACCOUNTING

- Introduction to Cost Accounting, Materials, Labor, Overheads, Non-Integrated Accounts, Methods, Job and Batch, Contract, Operating, Process and Operation, Standard Cost, Marginal Costing, Budget and Budgetary Control.
- Cost Management, Cost Volume Profit Analysis, Pricing Decisions, Budgets and Budgetary Control, Standing Costing and Variance Analysis, Transfer Pricing, Cost Management in Service Sector and Financial Decision Modelling, Employee Stock Option and buy back of securities.

3. COMPANY LAW AND ALLIED LAWS

Company Law 2013, Insolvency and Bankruptcy Code 2016, The Indian Contract Act, 1872; The Negotiable Instrument ACT, 1881, The Payment of Bonus Act 1965, The Foreign Exchange Management Act, 1999.

4. DIRECT TAX LAWS

The Income Tax Act, 1961 and Rules thereunder.

5. INDIRECT TAX LAWS INCLUDING GOODS AND SERVICES TAX & CUSTOMS & FOREIGN TRADE POLICY

Goods and Services Tax (GST) Law as contained in the Central Goods and Services Tax (CGST) Act, 2017 and Integrated Goods and Services Tax (IGST) Act, 2017, Customs Law as contained in the Customs Act, 1962 and the Customs Tariff Act, 1975 and Foreign Trade Policy to the extent relevant to the indirect tax laws.

6. 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 Audit.
- Cost Audit and Record Rules.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF
SENIOR OFFICER (HR)
[POST CODE – (HR 13)]

Unit - I

Principles and Practices of Management: Development of management Thought, Contributions of Taylor, Fayol, Mayo, Mary Parker Follett and C.I. Barnard. Behavioural Approach, Systems Approach, Quantitative Approach and Contingency Approach. Function of Management: Planning and Decision Making, Organising, Staffing, Directing, Controlling, Coordinating.

Unit - II

Human Resource Management: Conceptual framework, Human Resource Planning, Job Analysis, Recruitment, Selection, Placement, Induction, Training and Development, Performance Management, Job Evaluation, Compensation Management, Employee Benefits and Incentives, Managing Career. New Trends in HRM: Changing environment of HRM and contemporary challenges, Emerging HRM Concepts.

Unit - III

Human Resource Development (HRD): Concepts, Assumptions, Values, HRD Mechanisms, Action – research Model, HRD Culture and Climate, HRD Interventions, HR Accounting and Audit, Consultant – client relationship, Knowledge Management, Human Resource Information System. International Human Resource Management (IHRM): Organisational context of IHRM, IHRM and Sustainable Business, Functions of IHRM, Cross – Cultural Studies, Cultural Diversity, Transnational Organisations, IHRM models.

Unit - IV

Organisational Behaviour: Concept, Scope, Nature of human behavior, Personality, Perception, Learning, Attitude, Motivation, Interpersonal Behaviour, Group Dynamics, Leadership, Communication, Power and Authority, Stress, Organisational Change and Development.

Unit - V

Industrial Relations: Concept, Scope, Evolution, Approaches, Actors and Models, Conflict and cooperation, Bi-partitism, Tri-partitism, Collective Bargaining, Workers' Participation in Management, Grievance Handling and Disciplinary Action, Code of Conduct, Industrial Relations in changing scenario, Employers' organisations. Trade Unions: Concepts, Evolution, Problems of trade unions in India, Recognition, The Trade Unions Act, 1926. Emerging role of trade unions in India.

Unit - VI

Industrial Disputes: Factors, Forms, Trends, Prevention and Settlement, Role of State and Central Labour Administration, Strikes and Lockouts. The Industrial Employment (Standing Orders) Act, 1946. The Industrial Disputes Act, 1947.

Unit - VII

Labour Legislation: Objectives, Principles, Classification and Evolution. International Labour Organisation, Social Justice and Labour Legislation, Indian Constitution and Labour Laws.

- The Factories Act, 1948.
- The Mines Act, 1952.
- The Inter-state Migrant Workmen (Regulation of employment and conditions of service) Act, 1979.
- The Contract Labour (Regulation and Abolition) Act, 1970.
- The Building and other Construction workers (Regulation of employment and conditions of service) Act, 1996.
- The Child Labour (Prohibition and Regulation) Act, 1986.

Unit - VIII

Wages: Concept, Types, Factors influencing wages, Wage Theories and Wage Differentials

- The Minimum Wages Act, 1948.
- The Payment of Wages Act, 1936.
- The Payment of Bonus Act, 1965.
- The Equal Remuneration Act, 1976.
- The Payment of Gratuity Act, 1972.
- The Employees' Provident Fund and Miscellaneous Provisions Act, 1952.

Unit – IX

Labour Welfare: Concept, Scope, Types, Theories and Principles, Industrial Health and Hygiene, Industrial Accidents and safety, Occupational Diseases Social Security: Concept and Scope, Social Assistance and Social assurance.

Unit - X

Labour Market: Features, Demand and Supply of Labour, Nature and Composition of Indian Labour Force, Unemployment and Underemployment, Types of Labour Market, Characteristics of Indian Labour Market, New Dynamics of Labour Market in India, Economic Systems and Labor Market, Problems of Labour in India.