SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING GEOLOGIST

(SP GEO - 01)

SI. No	Topic	Particulars
1	**Structural Geology**	• Introduction to Rock Mechanics. • Folds, Faults and Joints, Shear zones, Unconformities. • Basics of Experimental Structural Geology. • Tectonic elements of Earth's Crust. • Plate Tectonics. • Structure & Tectonics of India
2	**Stratigraphy**	• Modern development in stratigraphy. • Formal stratigraphic classifications Stratotypes. • Facies in stratigraphy. Walther's Law of succession of facies. Types of Stratigraphic facies. • Methods of Correlation. • Sequence Stratigraphy: Accommodation Space Controls, Subsidence (tectonics and compaction), Sea Level (Eustasy), Sediment (rates and climate), Basic terms: systems tracts, sequence boundaries, maximum flooding surfaces, para-sequences. • Seismic stratigraphy: Development of the concepts and their significance. • Geology of Indian Peninsula. • Tectonic evolution of cratons and mobile belts in peninsular India. • Introduction to important Hadean, Archaean, Proterozoic successions of Indian Peninsula. • Dharwar, Singhbhum Cratons, Shillong Plateau. Proterozoic stratigraphy of Cudappah Vindhyan and Delhi Basins. • Paleogeography, Sedimentation and Paleoclimate during Gondwana Times. Distribution of Gondwana equivalents in other continents. • Stratigraphy and distribution of Triassic rocks of Spiti, Jurassic rocks of Kutch and Cretaceous rocks of Meghalaya and Cauvery Basins. • Volcanic provinces of India. Deccan Volcanics: Stratigraphy and Distribution and age. • Stratigraphy and Distribution of Tertiary rocks of upper Assam and Surma basins, Assam Arakan Mobile Belt, Meghalaya Basin and Arunachal foredeep. • Geology of Himalayas: Physiographic and Lithotectonic subdivisions of the Himalaya. Major thrusts and their boundaries. India & Asia collision. • Sedimentation and evolution of Himalayan foreland and intra-cratonic basins. Palaeozoic, Mesozoic and Cenozoic succession of the Himalayas • Stratigraphy of the Siwalik Group.

SI. No	Topic	Particulars
3	**Igneous and Metamorphic Petrology**	• Definition of Magma, Constitution of Magmas, Generation of Magmas. • Source rock composition: upper mantle and lower crust, evolution of magma. • Rare earth elements and their applications to petrogenesis. • IUGS classification of plutonic, hypabyssal and volcanic rocks, • Mid oceanic ridge volcanism, continental flood basalts, Deccan basalts, basalt magmatism associated with subduction zone. • Igneous rocks associated with convergent plate boundaries: ophiolite, granites and granites, continental rift associations.
4	**Geomorphology and Seismology**	• Basic concept of Geomorphology, Control of geomorphological features by geological structure, lithology & Climate. • Physical, chemical, and biological processes in weathering, Soil profiles and nomenclature of horizons, Classification of soils, Role of soil in geomorphology. • Fluvial system, drainage basin and networks, River and channel geometry, Longitudinal profile of river, Fluvial erosion, transportation and depositional processes and related landforms. • Morphometric analysis of basins. Concept of basin morphometry. • Formation of deserts, desert characteristics Eolian processes and landforms. • Energetics of shore-zone processes - waves, tides and currents. • Coastal landforms: Coastal submergence and emergence-shoreline development. • Cycles of climatic changes and landforms. • Geomorphological subdivisions of Indian subcontinents. • Tectonic Geomorphology: Concept, topographic markers and geomorphic indices of active tectonics.
5	**Geological & Geochemical Exploration**	• Mineral Exploration and Exploration Geology • Stages and norms of exploration. • Geological techniques and procedures of exploration. • Geological mapping phases and types. Sampling methods and ore reserve estimation. • Exploration of important economic mineral deposits. • Study of geological maps and sections, stratigraphic columns, structure contour maps, isopach maps, facies maps. • Exploratory drilling: brief reviews of different drilling methods, planning, selection of sites, core logging and records. • Special properties of trace and REE. Radioactive isotopes and their application to geochronology and petrogenesis. • Stable isotopes and their application to earth system processes. • Geochemistry in Mineral exploration.

SI. No	Topic	Particulars
6	**Remote Sensing**	• Aerial photography: Photographic flight planning, Aerial camera, film and filters. • Geometric characteristics of Aerial photographs: Geometry of vertical aerial photographs, Terminology, Tilt and image displacement, Stereoscopic parallax, stereoscopy and vertical exaggeration. • Aerial photographs in field mapping and preparation of photogeological maps. • Working principles and use of simple photogrammetric instruments. • Methods of quantitative determination of height, dip of bed, stratigraphic thickness and throw. • Remote sensing sensors and platforms. Remote sensing data products, Concept of Digital Image Processing: Geometric and radiometric corrections. • Principles of photo interpretation. Elements of photo interpretation: scale, tone, colour, texture, pattern, shape, size, drainage patterns, drainage anomaly. • Applications: Photogeological Techniques in lithological and structural interpretation. • Geological features identification from Remote Sensing Techniques. • Space Missions : Global and Indian space mission: LANDSAT, METEOSAT, SEASAT. SPOT, IRS. • GIS - Concepts, components, data formats and structure.
7	**Palaeontology**	• Organic life, fossil: Introduction to Taphonomy, Organic evolution & General principles of palaeontology. • Microfossils. • Morphology and geological distribution of Foraminifera. • Palynological guide fossils of India. • Cretaceous-Palaeocene-Eocene microfossil assemblages of Assam, Meghalaya and Arunachal Pradesh and their age and environmental significance. • Application of microfossils (fauna and flora) in Hydrocarbon exploration, Palaeo-oceanographic interpretation, Climate change interpretation. • Oxygen and Carbon Isotope studies of microfossils. • Introduction to Biofacies, Microfacies and Palynofacies. • Biostratigraphy and biostratigraphic zonation. • Biomarker
8	**Non-conventional Energy**	• Components of Energy : Non-Renewable and Renewable. • Production of Thermal energy using fossil fuels and solar energy. • Geothermal and Tidal Energy: Basic principles, Systems used in practice and applications Resource assessment.
9	**Geoscientific Data Analysis with Matlab and Petrel**	• Introduction to Matlab. • Image processing using Matlab. Signal processing using Matlab. • Simulation, regression, classification and optimization. • Brief on Reservoir modeling using Petrel.

SI. No	Topic	Particulars
10	**Sedimentology**	• Condition of sedimentation on the earth surface. • Origin and occurrence of siliciclastic, carbonate sediments and other chemical/biochemical sedimentary rocks. • Physical processes of sediment movement and sedimentation. • Sedimentary textures and structures. Use of textures and structures in interpreting depositional conditions. • Classification of sedimentary rocks: classification of conglomerate, sandstones, mudstone and carbonate rocks. • Sedimentary environments, facies association and models for major environments. • Palaeocurrent analysis, heavy minerals analysis. • Sedimentary Facies and Sequence Analysis. • Provenance of siliciclastic sedimentary rocks. • Diagenesis of sandstones, mudstone and carbonate rocks. • Sedimentation and Tectonics: Classification of tectonic basins, sandstone composition and basin evaluation. • Application of Stable isotopes in sedimentological studies.
11	**Geochemistry: Principles & Applications**	• The Elements and the Periodic Table, • Chemical bonding, Geochemical classifications, atomic nucleus and isotopes. • Basics, Methods for analysis, Major and minor elements in the crust, Normative minerals, Variation diagrams. • Basics, Element distribution, rare earth elements: a special group of trace elements, Isotopes: radioactive & stable. • Carbon cycle, origin composition and structure of organic matter, Optical and geochemical methods for source rock characterization and maturation assessment.
12	**Elements of GIS**	• Introduction and definitions of GIS, components, application areas of GIS, advantages and disadvantages of GIS. • Data formats, Data structure, Raster data model and vector data model, Raster versus vector, Advantages and disadvantages of raster and vector. • Functional elements of GIS: Data acquisition, Data input and data processing, data management system, product and report generation. • Coordinate systems: Cartesian Coordinate System, Geographic Coordinate system. • Map Projection: Definition, Classification and types of map projection, Polyconic projection, UTM projection, Latitude/Longitude geographic coordinates. • Digital Image processing and GIS software (ArcGIS, ERDAS).

SI. No	Topic	Particulars
13	**Geophysical Exploration**	• Surveying natural potentials: Exploring shallow natural potentials, Telluric currents, Telluric current surveying, Magneto telluric surveying, Field examples. • Electromagnetic surveying: The principle of EM surveying, parallel line dip angle EM surveying, Horizontal-loop EM surveying, Airborne EM surveying, Field examples. • Electrical resistivity surveying: Ohm's law and resistivity, current flow in three dimensions, current density, current flow across a boundary, Measuring resistivity, Equipment for electrical resistivity surveying, Sounding and profiling. • Seismic methodology and brief on interpretation •
14	**Petroleum Geology**	• Introduction to Petroleum Geology. • Mode of occurrences of petroleum. • Surface, subsurface and Miscellaneous Physical and chemical nature of petroleum. • Organic/Inorganic Origin of petroleum, Migration and accumulation of Petroleum. • Source rocks, Source Rock Evaluation, Rock Eval pyrolysis. • Conversion of organic matter into Petroleum • Reservoir fluids: Gas, Oil and Water • Clastic and non-elastic reservoir rocks • Trapping Mechanism for Oil & Gas: Structural, Stratigraphic and Combination traps. • Drive mechanism of migration. • Concept of petroleum bearing basins and basin geology. • Petroliferous basins of India. • Petroleum Geology of India and world. • Geology of major oil and gas fields of India. • Future trends of oil exploration. • Details study of oil-gas fields of NE region. • World oil and gas reserves. • A brief review of the important oil fields of the world.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

Manager (F&A)

(MFA-02)

SI. No	Topic	Particulars
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, Internal Financial Controls (IFC).
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, Capital Budgeting.
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, Risk Analysis & Mitigation.
7	**Accounts Payable**	• Procure-to-Pay cycle overview • Vendor Master management • Invoice processing and validation • TDS deduction and compliance on vendor payments • Debit/Credit notes • GRN Matching and 3-way match • Ageing analysis, Vendor Reconciliation • Provisions for services/contracts under Ind AS 37
8	**Accounts Receivable**	• Order-to-Cash cycle • Customer billing and documentation • Collection Management and follow-up • Credit control policies • Provisioning for bad and doubtful debts under Ind AS • AR reconciliation and reporting
9	**Cash, Bank, Treasury & Insurance**	• Bank Reconciliation Statement (BRS) • Fund flow and liquidity management • Cash Flow Forecasting • Investment of idle/surplus funds • Handling of LC/BG documentation

		• Treasury Operations • General insurance: types, accounting, and claims management
10	**Payroll Accounting**	• Payroll process workflow • Salary structures, CTC break-up • TDS on salaries, Form 16 preparation • PF, ESI, Gratuity, Labour Welfare, and other statutory deductions • Payroll accounting and audit • Reimbursement claims and compliance
11	**Auditing and Assurance**	• Auditing concepts and standards (SA/ICAI guidelines) • Internal Control Systems and Risk-based Auditing • Vouching and Verification • Company Audit under Companies Act, Audit Report • Special Audits and Investigations • Cost Audit and maintenance of cost records
12	**Case Study or Practical Scenario Based**	Practical Scenario in: • Financial Statement Analysis • Tax Planning decision • Cost Optimization • Internal control review • Accounting compliance for a transaction

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (INSTRUMENTATION)
(SPE INS- 03)

A. Allied Discipline Knowledge:

- Basic Electronics Engineering and Basic Digital Electronics.
- Communication Systems (AM / FM / PCM)/ Networks.
- Fiber Optics Networks
- Power Supplies (UPS, Charger, Batteries).
- Basics Electrical Engineering.

B. Core Subject Knowledge:

Instrumentation & control system in Oil & Gas Industry - Drilling/ Work-over Rigs, Gas Compressors, Oil & Gas Processing Plants, Gas Gathering Stations, Tank Farms, Gas fired Heaters, Boilers, CODP Crude Oil and Natural Gas Production, Coil Tubing & Pumper Unit, LPG Recovery Plant, Electrical Power stations etc.

- **Sensors and Transducers:** Various types of sensors (pressure, temperature, level, flow, etc.) and their principles of operation, static and dynamic characteristics, and application selection.
- **Electronics and Electrical Measurements:** Analog and Digital electronics, signal conditioning, and instrumentation for measuring various parameters.
- **Control Systems and Process Control:** Feedback control loops, PID controllers, and various process control techniques used in industrial settings.
- **Industrial and Analytical Instrumentation:** Instruments used for chemical analysis, gas detection, and process monitoring.
- **PLC, SCADA and DCS:** Fundamentals of Programmable Logic Controllers (PLCs), SCADA and Distributed Control Systems (DCS) and their roles in automation.
- **Data Acquisition and Management:** Process of collecting, storing, and analysing data from various instruments.
- **Process Control in Oil and Gas:** Application of control systems and automation techniques in various oil and gas processes, such as separation, processing, dehydration, compression and transportation.
- **Instrumentation Design and Selection:** Design and select instruments based on process requirements, considering cost, reliability, and safety.
- **Troubleshooting and Maintenance:** Diagnosing and resolving issues with instrumentation equipment and systems. Systems, procedures, Guidelines on relevant best practices.
- **Calibration and Maintenance Procedures:** Calibration procedures for maintaining instrumentation equipment to ensure accuracy and reliability.
- **Industrial Communication Protocols:** Familiarity with common industrial communication protocols (e.g., Modbus, Profibus, HART, WirelessHART etc.).
- **Safety Systems:** Understanding the design and implementation of safety systems, including fire and gas detection systems, emergency shutdown systems, and alarm systems.
- **Instrumentation Deliverables:** Understanding the creation and interpretation of instrument index, P&ID, PFD. Design Basis, I/O lists, hook-up drawings, and other relevant documents.

- **Requirement analysis**: Identification of suitable instrumentation system with proper technical specifications, Procurement of instruments, installation & commissioning and monitoring & control of inventory, stock & spares of instrumentation systems.

C. Statutory Requirements:

Statutory knowledge for instrumentation engineers in the oil and gas industry which involves **understanding relevant regulations, standards, and legal requirements related to safety, process control, and equipment certification**. This includes knowing about hazardous area classification, equipment certification, and adherence to industry standards.

- **Statutory Provisions** - Mines Act 1952, OMR 2017, ISO certification, OISD - Basic knowledge of Safety Standards as per the latest OISD norms.
- **Safety Regulations and Standards:** Safety regulations and standards related to the oil and gas industry, such as those from organizations like the American Petroleum Institute (API) and the Institute of Electrical and Electronic Engineers (IEEE). These standards cover areas like fire safety, explosion prevention, and equipment selection for hazardous areas.
- **Hazardous Area Classification:** Understanding how areas are classified (e.g., Zone 0, Zone 1, Zone 2) is crucial for selecting appropriate instrumentation equipment. This ensures that equipment used in potentially hazardous areas is certified for safe operation.
- **Equipment Certification:** Understand the various certification requirements for equipment used in the oil and gas industry. This includes certifications for specific standards, such as those for explosion-proof enclosures or intrinsically safe devices.

D. Others:

- Knowledge in SAP_ERP module.
- Basic on Cyber Security.
- Public Procurement Procedures.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (PIPELINE T&I)
(SPE T&I - 04)

SI.No	Topic	Particulars
1	Engineering Mathematics	• Linear Algebra • Calculus • Differential Equations Vector Analysis Complex Analysis • Probability and Statistics
2	Basic Electrical Engineering	• Wheatstone bridge • DC circuits: • Electro-magnetism: • Single-phase AC circuits, • Transformers and efficiency • Basics of DC machines • Electrical power sources • Basics of cell, batteries and their uses • Basics of Electrical Installations
3	Electronic Devices	• Semiconductor Physics P-N junction • Basics of semiconductors, Diodes, Zeners • Junction & Field Effect Transistors, • Power Switching Devices • Optoelectronics
4	Networks, Signals and Systems	• Circuit Analysis- Thevenin & Norton , • Kirchoff's current and voltage laws • Continuous-time Signals • Discrete-time Signals LTI systems
5	Analog Circuits	• Simple diode circuits • Single-stage BJT and MOSFET amplifiers BJT and MOSFET amplifiers • Simple Op-amp circuits (Timer, PW Oscillator, Clipper, amplifiers) • Sinusoidal oscillators Power supplies
6	Digital Circuits	• Number Representation • Combinatorial circuits Logic Gates • Logic Families • Semiconductor Memories Sequential Circuits • Data Converters • Computer Organization
7	Communication Systems	• Random Processes • Frequency bands • Analog Communications, Modulation Techniques AM/FM/PSK/FSK etc • Information Theory, Nyquisit criterion, Shannon-Hartley • Digital Communications • Basics of Optical Communication, • Cellular Networks

SI.No	Topic	Particulars
8	Control Systems	• Basics of Control Systems • Feedback systems, Transfer function , Servo control • 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 • Design of control systems, compensators, elements of lead/lag compensation, • PID and industrial controllers.
9	Electronic Measurements And -Instrumentation	• Principles of measurement • Analog and Digital systems for measurement Electromagnetic Instruments • Electronic Instruments • Measurement systems for non-electrical quantities • Basics of telemetry (PLC /SCADA) • Different types of transducers and displays Data acquisition system basics
10	Computer Architecture, Programming, Networking	• Basics of Programming • Object Oriented Programming Basics Basic Data structures • Overview of data communication and Networking • 7 layer OSI reference model
11	Advanced Electronics Topics	• DSP: Discrete time signals/systems, uses • Digital filters Transmission line • Microprocessors & microcontrollers, Assembly language • Basics of Embedded systems
12	Power Electronics	• SCRs/Thyristors • IGBTs, Power transistors • AC/DC Converters, • Choppers and 1phase/3phase inverters • SMPS

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (ELECTRICAL)
(SPE EE - 05)

SI.No	Topic	Particulars
1	Circuits and Networks	Circuits and Networks, Two Port Network, Transients in Electric Circuits, Magnetically coupled circuits, Graph Theory, Application of Laplace Transform, Frequency Response, Fourier Analysis, Filter Circuits
2	Electromagnetic Field Theory	Vector Analysis, Electrostatics, Magnetostatics, Electromagnetic Field, Materials and Fields, Electromagnetic Waves.
3	Electrical Measurements and Measuring Instruments	Characteristics of Instruments and Measuring Systems, Measuring Instruments, Potentiometers, A.C and D.C. Bridges, Magnetic Measurement, Instrument Transformers, Measurement of Resistance, Inductance, Capacitance, Voltage, Current, Power, Power Factor and Electrical Energy.
4	Power System	General Induction, Transmission Line Parameters, Performance of Transmission Lines, Underground Cable, Distribution, Mechanical Design: (a) Line support, (b) Insulators, (c) Sag, (d) Corona, Substations, Neutral Grounding, Circuit Breakers, Protective Relays, Overvoltage Phenomenon in Power Systems, Over-voltage Protection and Insulation Co-ordination, HVDC Transmission and Systems of Electrical Power Transmission and Load Management, Economic Operation of Steam Power Plant, Elements of Hydrothermal Co-ordination, Transients in Power Systems.
5	Signal and System	Introduction to Signals and Systems, Introduction to System, Representation of Signals, Statistical Signal Analysis.
6	Electrical Machines	Electro-mechanical Energy Conversion, D.C. Machines, D. C. Motors, Transformer, Special Machines, Stepper Motor, Servo Motors, Fundamentals of A.C. Machine Windings, Poly-phase Induction Machines, Single Phase Induction Motors, Synchronous Machines, Other Motors: Phase Commutator Motors, Universal and Repulsion Motors, Reluctance Motors, (Conventional and Switched), Stepper Motor, Brushless D.C. Motor (BLDC).
7	Control System	Fundamentals of Control System, physical System Modelling, Introduction to Control System Components, Time Domain Analysis, the Root Locus Technique, Frequency Domain Analysis, Compensation Techniques, Discrete Time Systems, State-Space Analysis of Control Systems, Describing Function Analysis, Phase-Plane Analysis, Stability Analysis by Liapunov's Method, Design of Feedback Control Systems.
8	Microprocessor and Controller	Introduction, Microprocessor Architecture, Programming Microprocessors, Memory Interfacing, Data Transfer Techniques and their Implementation, Microcontrollers, Common Peripherals and their Interfacing, Important Features of some Advanced Microprocessors, Application of Microprocessors.

SI.No	Topic	Particulars
9	Power Electronics	Semiconductor, Power Devices, Converter Operation with SCRs: (i) Single Phase Controlled Rectifier, (ii) Three Phase Controlled Rectifier, (iii) Dual Converter and Cycloconverter Operating Modes, A.C. Voltage controller, SCR Commutation Circuits and Inverters: (i) Commutation Schemes (different classes), Forced Commutation Circuits, (ii) Single-phase and Three-phase Inverters, (iii) Voltage and Current Source Inverters, Output Voltage Control, Harmonic Elimination, Firing circuits for Inverters, Choppers, Applications.
10	Switchgear and Industrial Protection	Symmetrical Fault Analysis, Symmetrical Components and Unsymmetrical Fault Analysis, Neutral Grounding, Circuit Breakers, Protective Relays, Sub-stations, Lightning Arrestors.
11	Industrial Drives	Introduction, Dynamics of Electrical Drives, Selection of Motor Power Rating, Starting, Electric Braking, Control of Electrical Drives, Control of D.C. Drives, Thyristorized A.C. & D.C. Motor drives, Mechanical Features for Electrical Motors, Control of Induction Motor Drives, Industrial Applications.
12	High Voltage AC/DC	Breakdown Mechanism of Gases, Liquids and Solid Materials, Electrical Properties of High Vacuum, Overvoltage Phenomenon and Insulation Co-ordination, High Voltage Generation, Measurement of High Voltage and Currents, High Voltage Equipment, High Voltage Testing and Testing Techniques, Design, Planning and Layout of High Voltage Laboratory.
13	Flexible AC Transmission System	Flexible AC Transmission System (FACTS): Concepts and Opportunities, Basic Concept of Voltage Source Converter (VSC) and Current Source Converter (CSC), Power Flow in A.C. Systems, Static Shunt Compensation: SVC and STATCOM, Operation and Control of TSC, TRC and STATCOM, Compensatory Control, Comparison between SVC and STATCOM, Unified Power Flow Controller Applications, Introduction to Interline Power Flow.
14	Electrical Power Utilization, Traction and Conservation of Electrical Energy	Electric Heating, Welding, Traction, Storage, Electrical Losses and Energy Conversion, Electrical Transmission, Distribution and Utilization Losses, Classification, Reduction of Losses, Benefits of Electrical Energy Conservation, Energy Conservation in Lighting, Electric Furnaces, Electric Drives, Traction Systems, Use of Energy-efficient Equipment, Electrical Energy Audit.
15	Renewable Energy Sources and Management	Non-conventional Energy Sources, Introduction to Non-conventional Energy Sources, Solar Energy, Photovoltaic Energy Conversion, Wind Energy, Fuel Cell, Energy from Biomass, Geothermal Energy, Energy from the Ocean, Tidal Power, Components of Tidal Power Plant, Generation of Tidal Power, Estimation of Energy and Power, Ocean Thermal Energy Conversion (OTEC): Introduction, Types, Plants and their Specifications, Magneto-hydrodynamic Generation and Other Resources, Small Hydro Schemes, Hydrogen Energy, Thermoelectric Generation etc., Combined Operation utilizing more than one Source, Composite Systems, Solar Radiation, Applications of Solar Energy, Bio-conversion, Wind Energy, Energy Management and Conversion.
16	Distribution System Planning and Automation	Configuration of Distribution Systems, Load Characteristics, Distribution Transformers, Distribution Substation Design, Feedr Design, Voltage Regulation, Protection in Distribution Systems, SCADA, Distribution Automation.

SI.No	Topic	Particulars
17	Power Plant Engineering	Introduction to Power Plant Engineering, Diesel Plant, Hydro-electric Plant, Gas-Turbine Plant, Modern Trends in Power Plant Operation: Use of Computers in Power Stations, On-line Computer Control of Power Systems (SCADA), Load Dispatching and Load Forecasting.
18	Illumination Technology	Basics of Illumination Engineering, the Visual System, Light Sources and their Characteristics, Control of Light, Illumination and Measurement, Lighting Applications and Design Calculations.
19	Modelling and Simulation	System Models and Role of Simulation, Statistical Tools, Discrete Event Simulation, Modelling and Performance Evaluation of Computer Systems, Continuous System Simulation, Virtual Reality Modelling, Verification and Validation of Simulation Models.
20	Electrical Engineering Materials	Dielectrics, Behaviour of Dielectrics in Alternating Fields, Magnetic Properties of Materials, Conductors, Properties of Semiconductors, Conducting Materials, Insulating Materials.
21	Instrumentation	Introduction, Analytical Instrumentation, Transducers and Sensors, Non-destructive Testing Equipment, Data Transmission and Telemetry.
22	Advanced Engineering Mathematics	Linear Algebra, Complex Variables, Calculus, Vector Analysis, Linear Programming, Transform Calculus, PDE.
23	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.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (CIVIL)
(SPE CIV - 06)

Sl no	Particulars
1	Engineering Measurements & Drawing: Understanding of scales, units, and measurement systems used in civil engineering practices, along with the interpretation and study of engineering drawings.
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, pavement materials, and construction practices.
6	Basic knowledge of RCC/steel bridges, culverts, and basics of well and pile foundations.
7	Theory of Structure-basics of SFD/BMD/Truss Analysis/ILD/Deflections etc.
8	Strength of Materials - Stress-strain relationships, modulus of elasticity, Poisson's ratio, elongation, and related mechanical properties etc.
9	Estimation & Costing – Preparation of estimates for roads, bridges, culverts, water tanks, and industrial/residential buildings.
10	Knowledge on preparation of Technical Specifications, Bill of Quantities (BOQ), Bar Bending Schedules (including ductile detailing).
11	Knowledge of Schedule of Rates- CPWD DSR, Assam PWD/Arunachal PWD.
12	Basics of Surveying & Levelling (Dumpy Level, Theodolite, Total Station, GPS etc.)
13	Concrete Technology -Concrete Mix design, laboratory & field tests of Cement, Steel, Aggregates & Concrete.
14	Water Supply and Sanitation Engineering e.g. Pipe fittings, estimation of water demand, sanitary fittings, and basic plumbing design etc.
15	Environmental/Public Health Engineering- Basics of environmental protection laws, eco-restoration techniques, solid waste management, effluent treatment, design of manholes, junction boxes, septic tanks, etc.
16	Construction Safety measures- Safety practices, PPE, site safety norms, and risk mitigation.
17	Project Planning and Management: Basics of CPM, PERT, and Gantt charts for project scheduling.
18	Contract Management: Types of contracts, tendering procedures, dispute resolution, and contract execution.
19	Working knowledge and uses of construction equipment such as road rollers, excavators, hot mix plants, tar boilers, water sprinklers, concrete pumps, asphalt compactors, asphalt pavers, concrete batching plants, transit mixers, motor graders, vibratory soil compactors, concrete mixers, etc.
20	Familiarity with commonly used Indian Standards in civil engineering, including but not limited to: IS 456, IS 800, IS 1893 & Other applicable BIS codes as relevant to construction practice.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

MANAGER (HR)

(MHR-07)

Sl No	Topics	Particulars
1	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.
2	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.
3	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.
4	Organisational Behaviour	Concept, Scope, Nature of human behavior, Personality, Perception, Learning, Attitude, Motivation, Interpersonal Behaviour, Group Dynamics, Leadership, Communication, Power and Authority, Stress management, Organisational Change and Development.
5	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.
6	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.
7	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. • Maternity Benefit Act, • PoSH Act • RPwD Act

Sl No	Topics	Particulars
8	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.
9	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.
10	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.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (DRILLING)
(SPE DRI - 08)

Sl no	Particulars
1	Drilling Fluids: Basic Functions of a Drilling Fluid; Types of Drilling Fluids; Fluid Rheology
2	Fluid Mechanics for Drilling
3	Well Control: Procedures and Principles
4	Roller-Cone and Polycrystalline Diamond Drill Bits: Different bit types, Cutting structure for soft and hard formations, Roller-Cone Bit Components (Bearing, Seal, and Lubrication Systems), bit hydraulics, IADC bit classification system, bit nomenclature, Matrix-body PDC bits, PDC Cutters, Basic PDC Bit Design Principles, IADC Dull Grading System, Bit Selection and Operating Practices.
5	Directional Drilling: Applications; Directional-Well Profiles; directional-drilling tools; rotary-steerable systems
6	(RSS); Directional Survey; Survey Instruments; BHA Design for Directional Control
7	Casing Design: Design Objectives; Design Methods; Casing Setting Depth Selection;
8	Wellhead Systems
9	Cementing: Methods and Hardware e.g. Floating equipment, cementing plugs, stage tools, centralizers, and scratchers.
10	Drilling Problems and Solutions: Pipe Sticking; Differential-Pressure Pipe Sticking; Mechanical Pipe Sticking (Drilled Cuttings accumulation; Borehole Instability; Key Seating).
11	Loss circulation: Loss circulation zones (total loss/ partial loss) and causes; Prevention of Lost Circulation; Remedial Measures.
12	Drill pipe Failures: Twist off; Parting; failure as a result of Collapse and Burst; Fatigue; Pipe Failure Prevention.
13	Borehole Instability: Definition and Causes; Types and Associated Problems: Hole Closure, Hole Enlargement, Fracturing, Borehole collapse. Principles of Borehole Instability, Borehole Instability Prevention.
14	Well Planning: Objectives (Safety; Minimum Cost; Usable Holes); Well-Type Classification; Flow path for well planning; cost per foot analysis; well completions.
15	Emerging Drilling Technologies.
16	Drilling safety procedures & protocols.
17	Familiarity with statutory guidelines, including but not limited to OMR 2017 and relevant OISD (OIL Industry Safety Directorate) guidelines.
18	Drill string, Drill string components, design, stretch of drill pipes and drill pipe maintenance.
19	Open and cased hole fishing tools and fishing techniques.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (PRODUCTION)
(SPE PROD-09)

Sn.No.	Topic	Description
1	Oil and Gas Well Operations	• Well production and testing: Oil and gas well performance, flow rate measurement, bottom hole pressure (BHP) measurement, well test procedures. • Operation and maintenance of production installations: Oil collecting stations, group gathering stations, gas processing plants, tank farms, custody transfer of crude oil. • Surface production equipment / apparatus and control system such as Two C Three Phase Separators, Indirect Water Bath Heaters, Emulsion Treater, Electrostatic Emulsion Treater, various type of pumps including Reciprocating and Centrifugal Pumps, Fixed C Floating roof tanks, Control Valves, Different types of Process valves as per API 600 C API 6D, Metering system for oil C gas measurement. • Rheology of crude oil and Gas hydrates formation, prevention, and mitigation. • Process Flow diagrams for Oil/gas collecting and gathering stations. • Gas dehydration: Glycol dehydration process, methanol injection. • Safety relief valves: Design and applications. • Nodal analysis software for optimization of surface flow.
2	Well Intervention and Completion	• Well completion: Design, execution, types of completion. • Surface and downhole well completion C intervention equipment for oil C gas well like Tubing Head Spool, X-Mass Tree, Packers, Tubings C accessories, Sub-Surface Safety Valve, Surface Safety Valve. fishing tools. • Well intervention techniques: Well killing (oil and gas), well activation, scrapping, de-waxing, hole probing. • Coiled Tubing Unit (CTU), Nitrogen Pumping Unit (NPU), Fluid Pumping Unit (FPU), Hot Oil Circulating Unit (HOCU), Acidization Unit: Operation, maintenance, and applications. • Well stimulation: Gravel pack, hydrofracturing, acidization, enhanced oil recovery (EOR) processes. • Industries Standard Software for Well intervention C completion.
3	Artificial Lift Systems	• Types of artificial lifts: Gas lift, Sucker Rod Pump (SRP), Electrical Submersible Pumps (ESP), Progressing Cavity Pumps (PCP). • Design and installation: System selection, sizing, and integration. • Operation and troubleshooting: Performance monitoring, failure analysis.
4	Pipeline and Piping Systems	• Pipeline design: Flow, length, pressure calculations, pipe fittings, flow measurement systems. • Piping systems: Design C engineering for oil/gas process plants and effluent treatment plants. • Pipeline operations: Pigging, maintenance, and color coding for pipelines. • Process piping: Standards, layout, and integration.

Sn.No.	Topic	Description
5	Equipment and Instrumentation	• Gas compressors and engines: Types, components, operation, and maintenance. • Valves and control valves: Types, functions, maintenance, and instrumentation settings. • Control System: SCADA, Remote ignition, servo systems, and control valve automation.
6	Reservoir Management and Optimization	• Reservoir drive mechanisms • Water and gas injection: Design and implementation for pressure maintenance. • Nodal analysis: System optimization for production enhancement. • Enhanced oil recovery (EOR): Techniques and applications.
7	Safety, Standards, and Quality Control	• Statutory regulations: Oil Mines Regulations (OMR), DGMS, OISD, CPCB. • API standards: Well intervention, completions, process piping, well heads, and stimulation services. • Safety studies: Non-destructive testing (NDT), Hazard and Operability Study (HAZOP), Risk Management, QRA • Safety standards: Implementation and compliance monitoring.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (ENVIRONMENT)
(SPE ENV - 10)

Sl. No	Topics	Particulars
1	Environmental Chemistry:	• Fundamentals of Environmental Chemistry. • Principles of Water Chemistry. • Soil Chemistry. • Atmospheric Chemistry.
2	Environmental Microbiology:	• Prokaryotic and Eukaryotic Microorganisms; Characteristics & Classification; Plant -microbe and soil microbe interactions; Role of microorganisms in wastewater treatment and bioremediation. • Microbial Metabolism • Growth and control of Microorganisms. • Microbiology and health.
3	Water & Wastewater Treatment and Management	• Water and wastewater quality parameters; Eutrophication and thermal stratification in lakes; River Pollution - Oxygen sag curve. • Water treatment methods. • Point and non-point sources of wastewater; Population forecasting methods; Design of sewer and storm water sewers; Sewer appurtenances; Preliminary, Primary, Secondary and tertiary sewage treatment, Sludge generation, processing and disposal methods; Sewage farming. • Sources and characteristics of industrial effluents; Concept of Common Effluent Treatment Plants (CETP); Wastewater recycling and zero liquid discharge. • Kinetics and reactor design.
4	Air and Noise Pollution:	• Structure of the atmosphere, Natural and anthropogenic sources of pollution, Atmospheric sources, sinks, transport, Indoor air pollution, Effects of health and environment, Air pollution: gases and particulate matter, Air quality standards, Primary and secondary pollutants, Criteria pollutants, ambient and source standards, air quality indices, visibility. • Particulate Pollutants. • Gaseous Pollutants. • Automotive emission controls, fuel quality, diesel particulate, filters, catalytics convertors. • Air Quality Management. • Noise Pollution. • Instrumentation Techniques for Environmental Monitoring.
5	Solid and Hazardous Waste Management:	• Integrated solid waste management, waste hierarchy, Rules and regulations for solid waste management in India. • Municipal solid waste management in India. • Hazardous waste management. • Soil contamination and leaching of contaminants into groundwater. • Management of Biomedical waste, Plastics waste, E-waste, Construction & Demolition Waste.
6	Global and Regional Environmental Issues:	• Global effects of air pollution-Greenhouse gases, global warming, climate change, urban heat islands, acid rain, ozone hole • Principles of International Law and international treaties. • Environment conventions and protocols.

Sl. No	Topics	Particulars
7	Environmental Management and Sustainable Development	• Environmental Management Systems, ISO14000 series, Environmental auditing: Environmental Impact Assessment, Life cycle assessment, Human health risk assessment. • Environmental Law and Policy: Water Act, 1974 and Air Act, 1981 with amendments, The Environment (Protection) Act (EPA) 1986, National Green Tribunal Act, 2010, EIA Notification 2006 with amendments, Forest Conservation Act 1980 with amendments, Wildlife Protection Act 1972, Coastal regulation Zone (CRZ) Notification 2019, Central Ground Water Authority (CGWA) guidelines for groundwater extraction. • Renewable and Non-renewable energy sources.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (LOGISTICS)
(SPE LO - 11)

Sl.No	Topic	Particulars
1	Theory of Machines	• Simple Mechanisms, Friction and Friction Drives • 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. • Analysis of Plane Motion with Velocity diagram, Acceleration diagram; Kinematic synthesis of linkages;
2	Machine Design	• Types of Loads, Failure Theory, Designed stress and factor of safety, stress concentration, selection of materials, codes for design-BIS codes, Modes of Failure, Failure theories, Fits and Tolerance. • Shafting: Design of shaft subjected to bending, torsion, axial and combined loading Keys, Cotter and Knuckle joint • Coupling: Rigid and Flexible coupling • Power Transmission Elements: Belt and Chain Drives, design of Flat and V-belts • 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. • Design of Mechanical Springs – helical spring, Gears: Spur and Helical gear • Design of Friction clutches – single and multidisc clutch, cone clutch, Brakes – Disc, cone, band and internal expanding shoes. • Tribology, Design of Bearings – radial and Thrust journal bearings, Selection of Rolling Contact Bearings
3	Vibrations	• Basic Concepts • Measurement of Vibrations • Seismic transducers (ii) LVDT accelerometers (iii) Piezo-electric accelerometers • Free and forced vibration of single degree of freedom systems' effect of damping; vibration isolation; Resonance; • Critical speed of a shaft for whirling motion. • Two Degrees of Freedom System (2DOF) • Seismic Instruments • Multi Degree of Freedom Systems (MDOF)

Sl.No	Topic	Particulars
4	Engineering Mechanics	• Equilibrium of Rigid Bodies • Analysis of Structures • Friction • Centre of Gravity and Moment of Inertia • Lifting Machines • Virtual Work and Energy Method • Impulse, Momentum, Work and Energy • Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain, Strain Rosette. • Thin & Thick cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts. Eule/s theory of columns. • Testing of materials with universal testing machine (Uniaxial Tension Test/ engineering stress-strain curves,) • Testing of hardness and impact strength: Rockwell, Brinell and Vickers and their relation to strength.
5	Engineering Materials	• Structure and properties of engineering materials: Crystal Directions and Planes. • Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions • Heat treatment (Alloy), stress-strain diagrams for engineering materials. • Pattern making and sand casting – Pattern materials – Types – Pattern allowances. Core prints. Moulding sand – ingredients – classification – sand additives – properties of moulding sand – sand preparation and testing. Green sand mould preparation. Cores and core making – Types of cores • Principles of powder metallurgy. Principles of welding, brazing, and soldering.
6	Machining and Machine Tool Operations	• Mechanics of machining; Basic machine tools - Machining, definition, and objectives. Geometry of cutting tools. Cutting Tool Specification - single and multipoint cutting tools and materials, Mechanics of metal cutting, Mechanism of chip formation, Cutting tools materials and methods of failure; Assessment of tool life. Economics of Machining. • Non-Conventional Machining process - Principles of operation, Applications, Merits and Demerits of different non-conventional machining; Principles of work holding, Design of jigs and fixtures • Kinematics of Machine Tools • Measurement by Dynamometry
7	Metrology and Inspection	• Introductory Concept of engineering metrology, Statistical Process Control, Tolerance, Limits of Size and Fits, Tool Room Measuring Instruments; Measurement of Screw Threads • Measurement of Gears. • Surface Texture • Interferometry • Alignment Testing

Sl.No	Topic	Particulars
8	Production Planning and Control	• Production Planning and Control (Forecasting Models, Aggregate Production Planning, Scheduling, Material Requirement Planning). • Inventory control (EOQ Model, ABC, VED, FSN analysis) Modelling (Classification of inventory, Deterministic versus Stochastic problems situations, Formulation and solution of Deterministic inventory problems) • Operations Research (Linear Programming, and solutions in such cases as Integer Programming Problems (IPP), Transportation problem (TP) and Assignment Problem (AP) • PERT & CPM. • Network Analysis - PERT (Assumptions and computations related to PERT mode) & CPM (Crashing of jobs for minimum cost-time schedule for CPM models) • Maintenance Management - Meaning and Types of maintenance, and their suitability, Standards of maintenance, Total Productive Maintenance (TPM).
9	Fluid Mechanics	• Fluid Mechanics: Bernoulli's Theorem and its important applications, Viscosity, Co-efficient of Viscosity. • Streamline and Turbulent flow, Reynolds Number, Critical velocity, Poiseuille's equation for flow of liquid through a tube, Motion of a Rigid body in a viscous medium, Rotational Viscometer • Pressure and Fluid Statics, Kinematics of Fluids • Dynamics of Fluid Flow • Flow through pipes • Compressible Flow • Viscous Flow • Turbulent Flow
10	Thermodynamics & Power Engineering	• Basic Thermodynamics, Laws of Thermodynamics, Properties of steam, Air standard cycles, Fuels and Combustions • Boiler • Basic Steam Power Cycles • Steam Nozzles, Steam Turbines, Steam Condensers • Concepts of regeneration and reheat and I.C Engines: Air-standard Otto' Diesel • Air & Gas Compressors • Gas Turbine • Basic of Blower • Psychrometry
11	Turbo machinery	• Eular equation for turbo, Impulse turbine- Pelton wheel, Reaction Hydraulic turbine- Franci's turbine; Centrifugal Pump and Reciprocating Pump; Fluid System - Fluid couplings, Hydraulic dynamometer, Gear Pumps.

Sl.No	Topic	Particulars
12	Heat Transfer	• Modes of Heat Transfer, 1-D heat conduction, heat transfer through fins, unsteady heat conduction, lumped parameter system, Heisler's charts, Thermal Boundary layer, Dimensionless parameters in freed forced convective heat transfer, heat transfer correlations for flow over flat plates & through pipes, effect of turbulence, Heat exchanger performance, LMTD & NTU method, Radiative heat transfer, Stefan Boltzmann law, Wein's Displacement Law, Black & Grey Surfaces, View factors, Radiation Network Analysis.
13	Automotive Mechanics	• Automotive shop safety and tools-Safety in shop, Measuring systems and Measuring Tools, Automotive fasteners, Shop Hand Tools, Shop equipment and Power tools; Automotive Engines-Engine Fundamentals, Engine Types, Engine construction, Valves and Valve trains; Automotive Engine Systems-Automotive Fuel and exhaust systems, Automotive Carburetors, Fuel Injection systems of Gasoline, Diesel and CNG engines, Engine cooling system, Engine lubricating systems. • Automotive Electrical and Electronic equipment- Automotive electrical system, Automotive Batteries, Starting system, Charging system, Electronic Ignition system, other electrical and electronic devices; Automotive Emission Controls- Automotive Emission Control Systems; Automotive Engine Service; Automotive Power Trains-Automotive Clutches, Manual Transmissions and Transaxles, Four Wheel Drive and Transfer cases, PTO, Automatic Transmissions and transaxles, Drive lines and universal joints, Differential and Drive axles; Automotive Chassis- Springs and Suspension systems, Automotive steering system, Automotive Brakes, Tires and wheels.
14	Hydraulic and Pneumatic system	• Fundamentals of Hydraulics; Principle, construction & working of Hydraulic Pumps - Fixed & Variable Displacement (Vane, Variable Vane, Gear, Piston Pumps); Principle, construction and working of Pressure, Flow & Direction control Valves; Principle and working of Modular Valves; Principle, construction & working of Hydraulic Cylinders & Hydraulic Motors; Hydraulic System Accessories (Accumulators, Filters, Pipes & Hoses etc.); Hydraulic Circuits - Interpretation & analysis of different circuits, Hydraulic fluids, Contamination and Filtration. • Open loop System - Fixed vs Variable displacement Pumps - Pressure cut-off, Load sensing; Closed loop pumping systems and Hydrostatic Transmission; Monoblock & Mobile control Valves, Port Relief Valve, Flow divider; Bent axis Piston Pumps & Motors; Hydraulic fluid filtration for Mobile equipment; Maintenance of Mobile Equipment.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (FIELD ENGINEERING) (SPE FE-12)

Sl no	Syllabus
1.	Repair /Maintenance of Oil Field Equipment, like: Draw Works, Rotary tables, Mud Pumps, travelling block, Triplex/ Quintuplex Pumps, Gear Boxes etc. of various makes, Specialized & skilled welding techniques like :TIG(GTAW) / MIG(SMAW) welding, cast iron, aluminum, stainless steel welding etc. apart from conventional Arc and Oxyacetylene welding, brazing and soldering , Precision machining jobs, Rethreading of tubulars conforming to API standards, CNC Programming etc.
2.	Supply of potable water round the year, Operation and maintenance of Pontoons, source water system for raw water supply and Water Treatment Plants, Maintenance of Distribution of the water supply network, Sinking and maintenance of Deep/shallow Tube wells for supply of industrial, fire and potable water in installations, Design, fabrication, laying of water/ natural gas pipelines to various sizes.
3.	Overhauling & maintenance of all Internal Combustion Engines (SI- Spark Ignition and CI- Compression Ignition), Specialized Services like calibration of Fuel Pumps, Fuel Injectors, Torque converters, Governors, Turbochargers etc., Overhauling of Precision equipment like transmission system, different types of air compressors, Pumps, Hydraulic systems, Well servicing equipment etc.
4.	Power Generation, Crude Oil pumping systems, high pressure pumping for water injection services.
5.	Design & Installation of Fire Protection Systems of Hydrocarbon Handling facilities in accordance with OISD standards, Overhauling / Maintenance of Crude oil Storage Tanks (both Floating Roof and Fixed Roof types) including the "bottom plate replacement", operation and maintenance of Oily Sludge Processing Plant and flow improver dosing set up.
6.	Basics of Public Procurement Process.
7.	Basics of ERP System
8.	Basics of Projects Management
9.	Basics of the standards used in E&P industry like OISD, API, ASTM etc.
10.	Basics of Health, Safety and Environment related to E& P sector.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (PIPELINE MECHANICAL)
(SPE PM-13)

Sl.No	Topic	Description
1	Theory of Machines	Simple Mechanisms, Friction and Friction Drives 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. Analysis of Plane Motion with Velocity diagram, Acceleration diagram; Kinematic synthesis of linkages;
2	Machine Design	Types of Loads, Failure Theory, Designed stress and factor of safety, stress concentration, selection of materials, codes for design-BIS codes, Modes of Failure, Failure theories, Fits and Tolerance. Shafting: Design of shaft subjected to bending, torsion, axial and combined loading Keys, Cotter and Knuckle joint Coupling: Rigid and Flexible coupling Power Transmission Elements: Belt and Chain Drives, design of Flat and V-belts 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. Design of Mechanical Springs – helical spring, Gears: Spur and Helical gear Design of Friction clutches – single and multidisc clutch, cone clutch, Brakes – Disc, cone, band and internal expanding shoes Tribology, Design of Bearings – radial and Thrust journal bearings, Selection of Rolling Contact Bearings
3	Vibrations	Basic Concepts Measurement of Vibrations Seismic transducers (ii) LVDT accelerometers (iii) Piezo-electric accelerometers Free and forced vibration of single degree of freedom systems' effect of damping; vibration isolation; Resonance; Critical speed of a shaft for whirling motion. Two Degrees of Freedom System (2DOF) Seismic Instruments Multi Degree of Freedom Systems (MDOF).

Sl.No	Topic	Description
4	Engineering Mechanics	Equilibrium of Rigid Bodies Analysis of Structures Friction Centre of Gravity and Moment of Inertia Lifting Machines Virtual Work and Energy Method Impulse, Momentum, Work and Energy Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain, Strain Rosette. Thin & Thick cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts. Eule/s theory of columns. Testing of materials with universal testing machine (Uniaxial Tension Test/ engineering stress-strain curves,) Testing of hardness and impact strength: Rockwell, Brinell and Vickers and their relation to strength.
5	Engineering Materials	Structure and properties of engineering materials: Crystal Directions and Planes. Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions Heat treatment (Alloy), stress-strain diagrams for engineering materials. Pattern making and sand casting – Pattern materials – Types – Pattern allowances. Core prints. Moulding sand – ingredients – classification – sand additives – properties of moulding sand – sand preparation and testing. Green sand mould preparation. Cores and core making – Types of cores Principles of powder metallurgy. Principles of welding, brazing, and soldering.
6	Machining and Machine Tool Operations	Mechanics of machining; Basic machine tools - Machining, definition, and objectives. Geometry of cutting tools. Cutting Tool Specification - single and multipoint cutting tools and materials, Mechanics of metal cutting, Mechanism of chip formation, Cutting tools materials and methods of failure; Assessment of tool life. Economics of Machining. Non-Conventional Machining process - Principles of operation, Applications, Merits and Demerits of different non-conventional machining; Principles of work holding, Design of jigs and fixtures Kinematics of Machine Tools Measurement by Dynamometry

Sl.No	Topic	Description
7	Metrology and Inspection	Introductory Concept of engineering metrology, Statistical Process Control, Tolerance, Limits of Size and Fits, Tool Room Measuring Instruments; Measurement of Screw Threads Measurement of Gears. Surface Texture Interferometry Alignment Testing
8	Production Planning and Control	Production Planning and Control (Forecasting Models, Aggregate Production Planning, Scheduling, Material Requirement Planning). Inventory control (EOQ Model, ABC, VED, FSN analysis) Modelling (Classification of inventory, Deterministic versus Stochastic problems situations, Formulation and solution of Deterministic inventory problems) Operations Research (Linear Programming, and solutions in such cases as Integer Programming Problems (IPP), Transportation problem (TP) and Assignment Problem (AP)) PERT & CPM. Network Analysis - PERT (Assumptions and computations related to PERT mode) & CPM (Crashing of jobs for minimum cost-time schedule for CPM models) Maintenance Management - Meaning and Types of maintenance, and their suitability, Standards of maintenance, Total Productive Maintenance (TPM).
9	Fluid Mechanics	Fluid Mechanics: Bernoulli's Theorem and its important applications, Viscosity, Co-efficient of Viscosity. Streamline and Turbulent flow, Reynolds Number, Critical velocity, Poiseuille's equation for flow of liquid through a tube, Motion of a Rigid body in a viscous medium, Rotational Viscometer Pressure and Fluid Statics, Kinematics of Fluids Dynamics of Fluid Flow Flow through pipes Compressible Flow Viscous Flow Turbulent Flow

Sl.No	Topic	Description
10	Thermodynamics & Power Engineering	Basic Thermodynamics, Laws of Thermodynamics, Properties of steam, Air standard cycles, Fuels and Combustions Boiler Basic Steam Power Cycles Steam Nozzles, Steam Turbines, Steam Condensers Concepts of regeneration and reheat and I.C Engines: Air-standard Otto' Diesel Air & Gas Compressors Gas Turbine Basic of Blower Psychrometry
11	Turbo machinery	Eular equation for turbo, Impulse turbine- Pelton wheel, Reaction Hydraulic turbine- Franci's turbine; Centrifugal Pump and Reciprocating Pump; Fluid System - Fluid couplings, Hydraulic dynamometer, Gear Pumps.
12	Heat Transfer	Modes of Heat Transfer, 1-D heat conduction, heat transfer through fins, unsteady heat conduction, lumped parameter system, Heisler's charts, Thermal Boundary layer, Dimensionless parameters in freed forced convective heat transfer, heat transfer correlations for flow over flat plates & through pipes, effect of turbulence, Heat exchanger performance, LMTD & NTU method, Radiative heat transfer, Stefan Boltzmann law, Wein's Displacement Law, Black & Grey Surfaces, View factors, Radiation Network Analysis.

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

MANAGER (CONTRACTS & PURCHASE)
(MCP-14)

Sl no	Syllabus
1	Procurement Functions: Understanding core procurement processes, material management, contract management and inventory management. Knowledge on Public Procurement policy as per Department of Expenditure's (DoE) manuals on procurement of goods, services and works. Conversant with relevant Govt. guidelines/policies on public procurement with respect to MSME Order-2012, Make in India Policy, Steel Policy, GTE guidelines, Land Border Sharing policy etc.
2	Legal Aspects: Familiarity with legal issues related to the procurement of goods, services and works. Understanding on Arbitration, conciliation etc.
3	Customs and Import Procedures: Knowledge on Import & Export formalities including customs and GST regulations & formalities etc.
4	Cost Management: Emphasis on cost consciousness in procurement activities.
5	Digital Tools: Proficiency in computer applications, SAP systems, and the Government e-Marketplace (GeM) portal.
6	Communication Skills: Effective written and oral communication in procurement contexts.
7	Problem-Solving: Ability to address and resolve issues in procurement processes

SYLLABUS FOR WRITTEN EXAM FOR THE POST OF

SUPERINTENDING ENGINEER (RESERVOIR)
(SPE RES-15)

Linear Algebra: Matrix algebra, systems of linear equations, eigen-values and eigenvectors.

Calculus: Functions of single variable, limit, continuity and differentiability, Taylor series, mean value theorems, evaluation of definite and improper integrals, derivatives, total derivative, maxima and minima, gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, Stokes, Gauss and Green's theorems.

Differential Equations: First-order equations (linear and nonlinear), higher-order linear differential equations with constant coefficients, Cauchy's and Euler's equations, initial and boundary value problems, Laplace transforms, solutions of one-dimensional heat and wave equations and Laplace equations.

Probability and Statistics: Definitions of probability and sampling theorems, conditional probability, mean, median, mode and standard deviation, random variables, Poisson, normal and binomial distributions, linear regression analysis.

Numerical Methods: Numerical solutions of linear and non-linear algebraic equations. Integration by trapezoidal and Simpson's rule. Single and multi-step methods for numerical solution of differential equations.

Petroleum Exploration: Classification and description of some common rocks with special reference to elastic and nonelastic reservoir rocks. Origin, migration, and accumulation of petroleum. Basics of Petroleum exploration methods.

Oil and Gas Well Drilling Technology: Well planning, drilling method, drilling rigs, rig operating systems, drilling fluid's function and properties, drilling fluid maintenance equipment, oil & gas well cementing operations, drill bit types and their applications, drill string & casing string function, operations, selection & design, drilling problems, their control & remedies. Application of horizontal, multilateral, extended reach, slim wells.

Reservoir Engineering: Petrophysical properties of reservoir rocks, coring and core analysis, reservoir fluid properties, phase behaviour of hydrocarbon system, flow of fluids through porous media, water and gas coning, reservoir pressure measurements, reservoir drives, Primary and secondary recovery techniques, pressure maintenance techniques, reservoir drive mechanism and recovery factors.

Petroleum Production Operations: Well equipment, well completion techniques, well production problems and mitigation, well servicing & workover operations, workover & completion fluids, formation damage, well stimulation techniques, artificial lift techniques, field processing of oil & gas, storage and transportation of petroleum and petroleum products, metering and measurements in oil & gas, production system analysis and optimization, production testing, multiphase flow in tubing and flow-lines, nodal system analysis.

Offshore Drilling and Production Practices (Basic Awareness): Offshore oil and gas operations and ocean environment, offshore fixed platforms, offshore methods like mobile & dynamic mobile units, station keeping platform, jack-up, ships and semi-positioning system, offshore drilling from fixed submersibles, use of conductors and risers.

Petroleum Formation Evaluation: Evaluation of petrophysical properties of subsurface formations: principles, applications, advantages and disadvantages of SP, resistivity, radioactive, acoustic logs and tools used. Evaluation of CBL/VDL, USIT, SFT, RFT. Production logging tools: principles, limitations, and applications. Special types of logging tools. Casing inspection tools (principles, applications, and limitations), Formation Micro Scanner (FMS), NMR logging principles. Standard log interpretation methods. Cross-plotting methods.

Oil and Gas Well Testing: Diffusivity equation, derivation & solutions. Radius of investigation. Superposition principles, Horner's approximations, drill stem testing, pressure transient tests: drawdown and buildup-test analysis, wellbore effects, multilayer reservoirs, injection well testing, multiple well testing, interference testing, pulse testing, well-test analysis by use of type curves, gas well testing.

Reservoir Simulation & Modelling: Static and dynamic reservoir modelling approaches, PVT analysis, History matching techniques and numerical simulation methods.

Material Balance & Decline Curve Analysis: MBAL and volumetric methods for reserves estimation, tank models and drive mechanism identification, and decline curve analysis for forecasting production performance and estimating ultimate recovery.

Enhanced Oil Recovery Techniques: Basic principles and mechanisms of EOR, screening of EOR processes, concept of pattern flooding, recovery efficiency, permeability heterogeneity, macroscopic and microscopic displacement efficiency. EOR methods: chemical flooding, miscible flooding, thermal recoveries (steam stimulation, hot water & steam flooding, in-situ combustion), microbial EOR.

Reserve estimation and Petroleum Economics: Production forecast and reserves estimation methods, oil and gas prices, risk and uncertainty analysis, petroleum parameters, system and uncertainty analysis, financial analysis and accounting, petroleum fiscal system.

Latest Trends in Petroleum Engineering: Coal bed methane, shale gas, oil shale, gas hydrate, heavy oil, Underground Gas storage & CCUS.

Digital Tools & Programming: Basic Python/Excel for RE workflows, AI/ML tools-based application for Reservoir Engineers.

Health, Safety and Environment in Petroleum Industry: Overview of health hazards in petroleum operations including toxicity, asphyxiation, and exposure to sour gases. Safety systems such as shutdown mechanisms, gas and fire detection, and personal protective equipment. HSE policies and emergency response planning. Environmental impacts of drilling and production activities on air, water, and soil. Basics of environmental protection measures, waste management, and oil spill control.