

Paper-II English Writing Skills

The paper on English shall be framed in a manner to assess the writing skills including expression and understanding of the topic.

Syllabus for Paper III of Phase II

General Stream:

Economic and social Issues:

Growth and Development

1. Measurement of growth: National Income and per capita income
2. Poverty Alleviation and Employment Generation in India
3. Sustainable Development and Environmental issues. Economic Reforms in India
4. Industrial and Labour Policy
5. Monetary and Fiscal Policy
6. Privatization
7. Role of Economic Planning. Globalization
8. Opening up of the Indian Economy
9. Balance of Payments, Export-Import Policy
10. International Economic Institutions - IMF and World Bank
11. WTO
12. Regional Economic Co-operation.

Social Structure in India

1. Multiculturalism
2. Demographic Trends
3. Urbanization and Migration
4. Gender Issues
5. Social Justice : Positive Discrimination in favor of the under privileged
6. Social Movements
7. Indian Political System
8. Human Development
9. Social Sectors in India, Health and Education.

Finance and Management:

(I) Finance:

(a) Financial System:

1. Money Market, Capital Market
2. Reserve Bank of India- functions and conduct of monetary policy, Banking System in India , Financial Institutions - SIDBI, EXIM, NABARD, NHB, etc.
3. SEBI - functions and role
4. Prevention of Money Laundering
5. Know Your Client Framework

(b) Financial Markets Primary and Secondary Markets (Forex, Money, Bond, Equity, etc.), functions, instruments, recent developments.

(c) General Topics:

1. Risk Management in Financial Sector

2. Basics of Derivatives: Forward, Futures and Swap
3. Changing Landscape of Financial sector
4. Recent Developments in the Financial Sector, Portfolio Investment, Public Sector Reforms, Disinvestments
5. Financial Inclusion- use of technology
6. Alternate source of finance, private and social cost-benefit, Public-Private Partnership
7. Corporate Governance in Financial Sector, role of e-governance in addressing the issues of corruption and inefficiency in the government sector.
8. The Union Budget - Direct and Indirect taxes; Non-tax sources of Revenue, GST, Thirteenth Finance Commission and GST, Finance Commission, Fiscal Policy, Fiscal Responsibility and Budget Management Act (FRBM),
9. Inflation: Definition, trends, estimates, consequences; and remedies (control): WPI, CPI - components and trends.

(II) Management:

1. Management: its nature and scope ; The Management Processes; Planning, Organization, Staffing, Directing and controlling; The Role of a Manager in an Organization.
2. Leadership: The Tasks of a Leader; Leadership Styles; Leadership Theories; A successful Leader versus an effective Leader.
3. Human Resource Development: Concept of HRD; Goals of HRD; Performance Appraisal - Potential appraisal and development - Feedback and Performance Counselling - Career Planning - Training and Development - Rewards - Employee Welfare. Motivation, Morale and Incentives: Theories of Motivation; How Managers Motivate; Concept of Morale; Factors determining morale; Role of Incentives in Building up Morale.
4. Communication: Steps in the Communication Process; Communication Channels; Oral versus Written Communication; Verbal versus non-verbal Communication; upward, downward and lateral communication; Barriers to Communication, Role of Information Technology.
5. Corporate Governance: Factors affecting Corporate Governance; Mechanisms of Corporate Governance.

Specialized Subject (Legal/ Information Technology/ Engineering Streams):

Legal Stream:

1. Constitution of India
2. Law of Contracts - Indian Contracts Act, 1872, Specific Relief Act, 1963
3. Company Law- Companies Act, 2013
4. Criminal Law - Indian Penal Code, 1860 along with the Code of Criminal Procedure, 1973
5. Code of Civil Procedure, 1908
6. Jurisprudence
7. Law of evidence - Indian Evidence Act, 1872, The Oaths Act, 1969
8. Administrative law
9. Law of Torts - reference to the Consumer Protection Act, 1986
10. Property law - Transfer of Property Act, 1882, Indian Easements Act, 1882
11. Arbitration and Conciliation - The Arbitration and Conciliation Act, 1996
12. Taxation - important features of the Income Tax Act.
13. Law of Trusts - Indian Trusts Act, 1882 and the Maharashtra Public Trusts Act
14. Important Latin terms and maxims
15. Interpretation of statutes

Information Technology Stream:

1. Concepts on databases
2. Programming in Java/ C++/ VB/SOL
3. Data Warehousing/ Analytical tool (SAS, R, SAP, Oracle/ Microsoft BI)
4. Networking Concepts (LAN/ WAN etc.)
5. Information and Cyber Security/ IT Security/ Network Audit/ IT Act
6. Knowledge on Servers/ Storage

Questions may be related to:

1. Core Java 1.7
2. Java Spring Framework 3.0
3. Hibernate Framework 3.0
4. SOAP Web Service Development
5. JQuery, JSP, HTML
6. Mobile Apps Development
7. BPM Workflow
8. Dashboards and Business Intelligence Reports
9. Database Administration Oracle/ DB2
10. PL/SOL

Engineering Stream - Civil Engineering

1. **Building Materials:** Stone, Lime, Glass, Plastics, Steel, FRP, Ceramics, Aluminium, Fly Ash, Basic Admixtures, Timber, Bricks and Aggregates: Classification, properties and selection criteria; Cement: Types, Composition, Properties, Uses, Specifications and various Tests; Lime & Cement Mortars and Concrete: Properties and various Tests; Design of Concrete Mixes: Proportioning of aggregates and methods of mix design.
2. **Solid Mechanics:** Elastic constants, Stress, plane stress, Strains, plane strain, Mohr's circle of stress and strain, Elastic theories of failure, Principal Stresses, Bending, Shear and Torsion.
3. **Structural Analysis:** Basics of strength of materials, Types of stresses and strains, Bending moments and shear force, concept of bending and shear stresses; Analysis of determinate and indeterminate structures; Trusses, beams, plane frames; Rolling loads, Influence Lines, Unit load method & other methods; Free and Forced vibrations of single degree and multi degree freedom system; Suspended Cables; Concepts and use of Computer Aided Design.

4. **Design of Steel Structures:** Principles of Working Stress methods, Design of tension and compression members, Design of beams and beam column connections, built-up sections, Girders, Industrial roofs, Principles of Ultimate load design.
5. **Design of Concrete and Masonry structures:** Limit state design for bending, shear, axial compression and combined forces; Design of beams, Slabs, Lintels, Foundations, Retaining walls, Tanks, Staircases; Principles of pre-stressed concrete design including materials and methods; Earthquake resistant design of structures; Design of Masonry Structure.
6. **Construction Practice, Planning and Management:** Construction - Planning, Equipment, Site investigation and Management including Estimation with latest project management tools and network analysis for different Types of works; Analysis of Rates of various types of works; Tendering Process and Contract Management, Quality Control, Productivity, Operation Cost; Land acquisition; Labour safety and welfare.
7. **Flow of Fluids, Hydraulic Machines and Hydro Power:**
 - (a) **Fluid Mechanics, Open Channel Flow, Pipe Flow:** Fluid properties; Dimensional Analysis and Modelling; Fluid dynamics including flow kinematics and measurements; Flow net; Viscosity, Boundary layer and control, Drag, Lift, Principles in open channel flow, Flow controls. Hydraulic jump; Surges; Pipe networks.
 - (b) **Hydraulic Machines and Hydro power:** Various pumps, Air vessels, Hydraulic turbines - types, classifications & performance parameters; Power house - classification and layout, storage, pondage, control of supply.
8. **Hydrology and Water Resources Engineering:** Hydrological cycle, Ground water hydrology, Well hydrology and related data analysis; Streams and their gauging; River morphology; Flood, drought and their management; Capacity of Reservoirs.
Water Resources Engineering: Multipurpose uses of Water, River basins and their potential; Irrigation systems, water demand assessment; Resources - storages and their yields; Water logging, canal and drainage design, Gravity dams, falls, weirs, Energy dissipaters, barrage Distribution works, Cross drainage works and head-works and their design; Concepts in canal design, construction & maintenance; River training, measurement and analysis of rainfall.
9. **Environmental Engineering:**
 - (a) **Water Supply Engineering:** Sources, Estimation, quality standards and testing of water and their treatment; Rural, Institutional and industrial water supply; Physical, chemical and biological characteristics and sources of water, Pollutants in water and its effects, Estimation of water demand; Drinking water Standards, Water Treatment Plants, Water distribution networks.
 - (b) **Waste Water Engineering:** Planning & design of domestic waste water, sewage collection and disposal; Plumbing Systems. Components and layout of sewerage system; Planning & design. of Domestic Waste-water disposal system; Sludge management including treatment, disposal and re-use of treated effluents; Industrial waste waters and Effluent Treatment Plants including institutional and industrial sewage management.
 - (c) **Solid Waste Management:** Sources & classification of solid wastes along with planning & design of its management system; Disposal system, Beneficial aspects of wastes and Utilization by Civil Engineers.
 - (d) **Air, Noise pollution and Ecology:** Concepts & general methodology.
10. **Geo-technical Engineering and Foundation Engineering:**
 - (a) **Geo-technical Engineering:** Soil exploration - planning & methods, Properties of soil, classification, various tests and inter-relationships; Permeability & Seepage, Compressibility, consolidation and Shearing resistance, Earth pressure theories and stress distribution in soil; Properties and uses of geosynthetics.
 - (b) **Foundation Engineering:** Types of foundations & selection criteria, bearing capacity, settlement analysis, design and testing of shallow & deep foundations; Slope stability analysis, Earthen

embankments , Dams and Earth retaining structures: types, analysis and design, Principles of ground modifications.

11. Surveying and Geology:

- (a) **Surveying:** Classification of surveys, various methodologies, instruments & analysis of measurement of distances, elevation and directions; Field astronomy, Global Positioning System; Map preparation; Photogrammetry; Remote sensing concepts; Survey Layout for culverts, canals, bridges, road/railway alignment and buildings, Setting out of Curves.
- (b) **Geology:** Basic knowledge of Engineering geology & its application in projects.

12. Transportation Engineering:

Highways - Planning & construction methodology, Alignment and geometric design; Traffic Surveys and Controls; Principles of Flexible and Rigid pavements design

Tunneling - Alignment, methods of construction, disposal of muck, drainage, lighting and ventilation.

Railways Systems - Terminology, Planning, designs and maintenance practices; track modernization..

Harbours - Terminology, layouts and planning. Airports - Layout, planning & design.

Engineering Stream - Electrical Engineering

- 1. Electrical Materials:** Electrical Engineering Materials, crystal structures and defects, ceramic materials, insulating materials, magnetic materials - basics, properties and applications; ferrites, ferromagnetic materials and components; basics of solid state physics, conductors; Photo-conductivity; Basics of Nano materials and Superconductors.
- 2. Electric Circuits and Fields:** Circuit elements , network graph, KCL, KVL, Node and Mesh analysis, ideal current and voltage sources , Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems, transient response of DC and AC networks, Sinusoidal steady state analysis, basic filter concepts, two-port networks, three phase circuits, Magnetically coupled circuits, Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions, Ampere's and Biot-Savart's laws; inductance, dielectrics, capacitance; Maxwell's equations.
- 3. Electrical and Electronic Measurements:** Principles of measurement, accuracy, precision and standards; Bridges and potentiometers; moving coil, moving iron, dynamometer and induction type instruments , measurement of voltage , current , power, energy and power factor, instrument transformers, digital voltmeters and multi-meters, phase, time and frequency measurement, Q-meters , oscilloscopes, potentiometric recorders, error analysis, Basics of sensors, Transducers, basics of data acquisition systems.
- 4. Computer Fundamentals:** Number systems, Boolean algebra, arithmetic functions, Basic Architecture, Central Processing Unit, I/O and Memory Organisation; peripheral devices, data representation and programming , basics of Operating system and networking, virtual memory, file systems; Elements of programming languages, typical examples.
- 5. Basic Electronics Engineering:** Basics of Semiconductor diodes and transistors and characteristics, Junction and field effect transistors (BJT, FET and MOSFETS), different types of transistor amplifiers, equivalent circuits and frequency response ; oscillators and other circuits, feedback amplifiers.
- 6. Analog and Digital Electronics:** Operational amplifiers - characteristics and applications, combinational and sequential logic circuits, multiplexers, multi-vibrators, sample and hold circuits, ND and D/A converters, basics of filter circuits and applications, simple active filters; Microprocessor basics- interfaces and applications, basics of linear integrated circuits; Analog communication basics , Modulation and de-modulation, noise and bandwidth, transmitters and receivers, signal to noise ratio, digital communication basics, sampling, quantizing, coding, frequency and time domain in multiplexing, power line carrier communication systems.
- 7. Systems and Signal Processing:** Representation of continuous and discrete-time signals, shifting and scaling operations, linear, time-invariant and causal systems , Fourier series representation of

continuous periodic signals, sampling theorem, Fourier and Laplace transforms, Z transforms, Discrete Fourier transform, FFT, linear convolution, discrete cosine transform, FIR filter, IIR filter, bilinear transformation.

- 8. Control Systems:** Principles of feedback, transfer function, block diagrams and signal flow graphs, steady-state errors, transforms and their applications; Routh-hurwitz criterion, Nyquist techniques, Bode plots, root loci, lag, lead and lead-lag compensation, stability analysis, transient and frequency response analysis, state space model, state transition matrix, controllability and observability, linear state variable feedback, PIO and industrial controllers.
- 9. Electrical Machines:** Single phase transformers, three phase transformers - connections, parallel operation, auto-transformer, energy conversion principles, DC machines - types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors, Induction motors - principles, types, performance characteristics, starting and speed control, Synchronous machines - performance, regulation, parallel operation of generators, motor starting, characteristics and applications, servo and stepper motors.
- 10. Power Systems:** Basic power generation concepts, steam, gas and water turbines, transmission line models and performance, cable performance, insulation, corona and radio interference, power factor correction, symmetrical components, fault analysis, principles of protection systems, basics of solid state relays and digital protection; Circuit breakers, Radial and ring-main distribution systems, Matrix representation of power systems, load flow analysis, voltage control and economic operation, System stability concepts, Swing curves and equal area criterion. HVDC transmission and FACTS concepts, Concepts of power system dynamics, distributed generation, solar and wind power, smart grid concepts, environmental implications, fundamentals of power economics.
- 11. Power Electronics and Drives:** Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation, triggering circuits, phase control rectifiers, bridge converters - fully controlled and half controlled, principles of choppers and inverters, basic concepts of adjustable speed dc and ac drives, DC-DC switched mode converters, DC-AC switched mode converters, resonant converters, high frequency inductors and transformers, power supplies.