

(NCL) category should have OBC (NCL) certificate issued on or after March 01, 2019 but earlier than the due date (closing date) of the application.

- d. Relaxation of 10 (ten) years for PwBD candidates shall be applicable whether the post is reserved or not. Relaxation of 13 (thirteen) years for PwBD (OBC) candidates where vacancies are reserved for OBC candidates. Relaxation of 15 (fifteen) years for PwBD (SC/ST) candidates where vacancies are reserved for SC/ST candidates.
- e. Relaxation of 5 (five) years for Ex-servicemen. Ex-servicemen include Emergency Commissioned Officers/Short Service Commissioned Officers, who have rendered at least five years continuous Military Service and have been released a) on completion of assignment (including those whose assignment is due to be completed within one year from February 29, 2020) otherwise than by way of dismissal or discharge on account of misconduct or inefficiency or b) on account of physical disability physical disability attributable to Military Service or c) on invalidment. Emergency Commissioned Officers/Short Service Commissioned Officers who have completed their initial period of assignment of five years of Military Service but whose assignment has been extended beyond five years and in whose case the Ministry of Defence issues certificates that they would be released on selection within three months from the date of receipt of offer of appointment.
- f. Candidates belonging to the Scheduled Castes and the Scheduled Tribes and the Other Backward Classes who are also covered under the category of Persons with Benchmark Disabilities and Ex-servicemen will be eligible for grant of cumulative age-relaxation.

Where there is no vacancy reserved for OBC/SC/ST category candidates, such candidates can still apply. However, they will not be eligible for any relaxations. SC/ ST candidates are exempt from payment of application fee even in such case but will have to pay specified intimation charges. OBC/ PwBD candidates should possess a latest certificate to this effect issued by the Competent Authority in the prescribed Format (formats are available on the SEBI website).

II. MODE OF SELECTION: Mode of selection shall be a three stage process i.e. Phase I (on-line screening examination consisting of two papers of 100 marks each), Phase II (on-line examination consisting of two papers of 100 marks each) and Phase III (Interview).

a. Phase I On-Line Examination:

An online screening examination consisting of two papers (Multiple Choice questions of 100 marks each) will be held on April 12, 2020. The exam will consist of:

| Paper | Streams/ Subjects | Maximum Marks | Duration | Cut off |
|--------------------------|--|---------------|------------|------------|
| Paper 1 | All Streams: Multiple choice questions on the subjects viz. General Awareness (including some questions related to Financial Sector of easy to moderate difficulty level), English Language, Quantitative Aptitude and Test of Reasoning. | 100 | 60 minutes | 30% |
| Paper 2 | General Stream: Multiple choice questions on subjects Commerce, Accountancy, Management, Finance, Costing, Companies Act and Economics. | 100 | 40 minutes | 40% |
| | Legal, Information Technology, Engineering Stream (Civil & Electrical), Official Language stream: Multiple choice questions on Specialized subject related to stream. | 100 | 40 minutes | 40% |
| | Research Stream:- Multiple choice questions on subjects Economics, Econometrics, Statistics, Finance and Commerce. | | | |
| Aggregate Cut off | | | | 40% |

- i. There shall be negative marking (1/4th of marks assigned to the question) for the Paper 1 and Paper 2 in Phase I.
- ii. There shall be a cut-off of minimum 30% for Paper 1 (no sectional cut-off shall be there) and a cut-off of minimum 40% for Paper 2 in Phase I.

- iii. Candidates would need to secure separate cut-off in each paper as mentioned at (ii) above as well as aggregate cut-off marks of 40% in Phase I exam to be shortlisted for Phase II. Marks obtained in Phase I shall be used only for shortlisting the candidates for Phase II examination process and will not be counted for final selection of the candidates.
- iv. Subject to the criteria mentioned at (iii) above, all the candidates who clear Phase I shall be shortlisted for Phase II. List of candidates shortlisted for Phase II will be made available on SEBI website.

Syllabus for the papers in Phase I is available in the **Annexure** to this advertisement.

b. Phase II On-Line Examination:

An on-line examination consisting of two papers of 100 marks each will be held on May 03, 2020. The papers shall be as follows:

| Paper | | Maximum Marks | Duration | Cut off | Weightage |
|--------------------------|---|---------------|------------|------------|-------------------|
| Paper 1 | All streams: English (Descriptive Test) to test the drafting skills | 100 | 60 minutes | 30% | 1/3 rd |
| Paper 2 | General Stream: Multiple choice questions on subjects Commerce, Accountancy, Management, Finance, Costing, Companies Act and Economics. | 100 | 40 minutes | 40% | 2/3 rd |
| | Legal, Engineering Stream (Civil & Electrical) and Official Language stream: Multiple choice questions on Specialized subject related to stream. | 100 | 40 minutes | 40% | 2/3 rd |
| | Research Stream:- Multiple choice questions on subjects Economics, Econometrics, Statistics, Finance and Commerce. | | | | |
| Aggregate Cut off | | | | 40% | |

Note:- The details with respect to Paper – 2 of Phase II for Information Technology Stream shall be made available on SEBI website (www.sebi.gov.in) in due course.

- i. Candidates shortlisted for Phase II will be issued new Hall Tickets.
- ii. For candidates who have applied in multiple streams, Paper II will be conducted in various shifts, the timings of which will be intimated in the Hall Ticket.
- iii. There shall be negative marking (1/4th of marks assigned to the question) for Paper 2 in Phase II (except IT stream for which details shall be informed in due course).
- iv. There shall be a cut-off of minimum 30% for Paper 1 and a cut-off of minimum 40% for Paper 2 in Phase II.
- v. Candidates would need to secure separate cut-off in each paper as mentioned at (iv) above as well as aggregate cut-off marks of 40% in Phase II exam (weightage of 1/3rd for Paper 1 and 2/3rd for Paper 2) to be shortlisted for Phase III.
- vi. Subject to the criteria mentioned at (v) above, candidates equaling 3 times the number of vacancies shall be shortlisted, in order of merit, for Phase III i.e. the Interview. List of candidates shortlisted for Interview will be made available on SEBI website.

Note: All question papers (in both the Phases, except the test of English) will be set bilingually in Hindi and English.

Syllabus for the papers in Phase II is available in the **Annexure** to this advertisement.

- c. **Interview:** Only the shortlisted candidates will be called for interview. Application fee shall not be refunded to the candidates not shortlisted for Phase II and Interview. Candidate may opt for interview either in Hindi or English. Weightage of marks obtained in Phase II will be 85%, while marks obtained in interview shall be given a weightage of 15%.

SEBI reserves the right to modify the selection procedure, if deemed fit.

Annexure

Syllabus for Paper 2 of Phase I & Phase II in General Stream **(Common Syllabus for both phases)**

A. Commerce & Accountancy

- a) Accounting as a financial information system;
- b) Accounting Standards with specific reference to Accounting for Depreciation, Inventories, Revenue Recognition, Fixed Assets, Foreign Exchange Transactions, Investments.
- c) Cash Flow Statement, Fund flow statement, Financial statement analysis; Ratio analysis;
- d) Accounting for Share Capital Transactions including Bonus Shares, Right Shares.
- e) Employees Stock Option and Buy-Back of Securities.
- f) Preparation and Presentation of Company Final Accounts.

B. Management

- a) Management: its nature and scope; The Management Processes; Planning, Organization, Staffing, Directing and Controlling;
- b) The Role of a Manager in an Organization. Leadership: The Tasks of a Leader;
- c) Leadership Styles; Leadership Theories; A successful Leader versus an effective Leader.
- d) Human Resource Development: Concept of HRD; Goals of HRD;
- e) Motivation, Morale and Incentives: Theories of Motivation; How Managers Motivate; Concept of Morale; Factors determining morale; Role of Incentives in Building up Morale.
- f) 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.

C. Finance

1) Financial System

- a) Role and Functions of Regulatory bodies in Financial Sector.

2) Financial Markets

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

3) General Topics

- a) Basics of Derivatives: Forward, Futures and Swap
- b) Recent Developments in the Financial Sector
- c) Financial Inclusion- use of technology
- d) Alternate source of finance, private and social cost-benefit, Public-Private Partnership
- e) Direct and Indirect taxes; Non-tax sources of Revenue, GST, Finance Commission, Fiscal Policy, Fiscal Responsibility and Budget Management Act (FRBM),
- f) Inflation: Definition, trends, estimates, consequences, and remedies (control): WPI, CPI - components and trends.

D. Costing

1. Overview of Cost and Management Accounting - Introduction to Cost and Management Accounting, Objectives and Scope of Cost and Management Accounting.
2. Methods of Costing - Single Output/ Unit Costing, Job Costing, Batch Costing, Contract Costing, Process/ Operation Costing, Costing of Service Sectors.
3. Basics of Cost Control and Analysis - (i) Standard Costing, (ii) Marginal Costing, (iii) Budget and Budgetary Control.
4. Lean System and Innovation:-
 - a) Introduction to Lean System
 - b) Just-in-Time (JIT)

- c) Kaizen Costing
- d) 5 Ss
- e) Total Productive Maintenance (TPM)
- f) Cellular Manufacturing/ One-Piece Flow Production Systems
- g) Six Sigma (SS)
- h) Introduction to Process Innovation and Business Process Re-engineering (BPR).

E. Companies Act

The Companies Act, 2013 – Specific reference to Chapter III, Chapter IV, Chapter VIII, Chapter X, Chapter XI, Chapter XII and Chapter XXVII.

F. Economics

- a) Demand and Supply, Market Structures, National Income: Concepts and Measurement, Classical & Keynesian Approach Determination of output and employment, Consumption Function, Investment Function, Multiplier and Accelerator, Demand and Supply for Money , IS – LM, Inflation and Phillips Curve, Business Cycles
- b) Balance of Payments, Foreign Exchange Markets, Inflation, Monetary and Fiscal Policy, Non-banking Financial Institutions.

Specialized Subject (Legal / Information Technology / Engineering/ Research Streams/Official Language Stream):

Syllabus for Paper 2 of Phase I & Phase II in Legal Stream

| Phase I | | |
|----------------|--|-------------------|
| Sl. No. | Subject | Weightage* |
| 1. | Constitution of India – Preamble, Part I, Part III, Part IV, Part IVA, Part V, Part VI, Part VIII, Part IXA, Part IXB, Part XI. | 10% |
| 2. | Law of Contracts – Indian Contract Act, 1872 (Chapters I to VI), Specific Relief Act, 1963. | 10% |
| 3. | Criminal Law – Indian Penal Code, 1860 (Chapters I, II, III, IV, V, VA, VI, IX, XVII); Code of Criminal Procedure, 1973. | 15% |
| 4. | Law of Evidence – Indian Evidence Act, 1872. | |
| 5. | Code of Civil Procedure, 1908 – Part I, Part II. | |
| 6. | Administrative Law and Principles of Natural Justice | 10% |
| 7. | Jurisprudence and Interpretation of Statutes | 10% |
| 8. | Important Latin terms and maxims | |
| 9. | Law of Torts and Consumer Protection Act, 2019 | 5% |
| 10. | Arbitration and Conciliation Act, 1996 – Part I | 5% |
| 11. | Transfer of Property Act, 1882 – Chapter III, Chapter IV, Chapter V. | 5% |
| 12. | Companies Act, 2013 – Chapter I, Chapter II, Chapter III, Chapter IV, Chapter V, Chapter VII, Chapter VIII, Chapter IX, Chapter X, Chapter XI, Chapter XII, Chapter XIII, Chapter XV, Chapter XVI. | 15% |
| 13. | Securities Laws – SEBI Act, 1992, SC(R) Act, 1956, Depositories Act, 1996 | 15% |

* Weightages are indicative only

| Phase II | | |
|-----------------|---|-------------------|
| Sl. No. | Subject | Weightage* |
| 1. | Constitution of India – Preamble, Part I, Part III, Part IV, Part IVA, Part V, Part VI, Part VIII, Part IXA, Part IXB, Part XI, Part XII, Part XIII, Part XIV, Part XIVA, Part XX. | 10% |
| 2. | Law of Contracts – Indian Contract Act, 1872 (Chapters VIII to X), Indian Partnership Act, 1932, Specific Relief Act, 1963 | 10% |
| 3. | Criminal Law – Indian Penal Code, 1860 (Chapters I, II, III, IV, V, VA, VI, IX, XVII, XXI, XXII, XXIII); Code of Criminal Procedure, 1973. | 10% |
| 4. | Law of Evidence – Indian Evidence Act, 1872. | |
| 5. | Code of Civil Procedure, 1908 – Part I, Part II, Part III, Part IV, Part V, Part VII, Schedule I. | |
| 6. | Administrative Law and Principles of Natural Justice | 10% |
| 7. | Jurisprudence and Interpretation of Statutes | |
| 8. | Important Latin terms and maxims | |
| 9. | Law of Torts and Consumer Protection Act, 2019 | 15% |
| 10. | Arbitration and Conciliation Act, 1996 – Part I, Part III, Part IV. | |
| 11. | Transfer of Property Act, 1882 – Chapter III, Chapter IV, Chapter V. | |
| 11. | Law of Trusts – Parties to a Trust Deed and Duties of Trustees. | 20% |
| 12. | Corporate Law – Companies Act, 2013 (Chapter I, Chapter II, Chapter III, Chapter IV, Chapter V, Chapter VII, Chapter VIII, Chapter IX, Chapter X, Chapter XI, Chapter XII, Chapter XIII, Chapter XV, Chapter XVI, Chapter XXVII, Chapter XXVIII, Chapter XXIX); Limited Liability Partnership Act, 2008; Insolvency and Bankruptcy Code, 2016 (Part I, Part II) | |
| 13. | Taxation – General principles, Capital Gains Tax, Securities Transaction Tax | |
| 14. | Securities Laws – SEBI Act, 1992, SC(R) Act, 1956, Depositories Act, 1996 | 20% |

* Weightages are indicative only

Syllabus for Paper 2 of Phase I in Information Technology Stream

| Phase I | | | |
|--------------|---------------------------------------|---|------------|
| Sr. No. | Topic | Details | Weightage* |
| 1. | Database Concepts | ER-model. Relational model: relational algebra, tuple calculus, Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees), Transactions and concurrency control. | 10 |
| 2. | SQL Queries | Select, view, truncate, delete, update, alter, Inner join, different types of outer joins,, use of aggregate functions, Union, intersection, except, in and exist clauses, nested queries | 10 |
| 3. | Programming Concepts (Java /C C++) | Program control (iteration, recursion, Functions), Scope of variables, Binding of variables & functions, Parameter passing, Functional and Logic Programming, OOPS Concepts, Inheritance, Class and object, Constructors, Functions, Exception Handling | 30 |
| 4. | Data Analytics Languages (Python / R) | Regex, Slicing, Data reshaping, Dataframes, Dictionaries and Sets, File Management, Classes and Functions, Data Mining, Lists, Importing and exporting data, charts and graphs | 10 |
| 5. | Algorithms for problem solving | Tree and graph traversals, Connected components, Spanning trees, Shortest paths; hashing, Sorting, Searching; Design techniques (Greedy, Dynamic Programming, Divide-and-conquer) | 10 |
| 6. | Networking Concepts | ISO/OSI stack, LAN Technologies (Ethernet, Token ring), TCP/UDP, IP, Basic concepts of switches, gateways, and routers, Application layer protocols (DNS, SMTP, POP, FTP, HTTP), Firewalls | 10 |
| 7. | Information & Cyber Security Concepts | Cyber Attacks, Software Development Security, Network security, Authentication, CIA - Confidentiality, Integrity and Availability, Network Audit, Systems Audit | 10 |
| 8. | Data warehousing | Data Extraction, Data Cleaning, Data Transformation, Data Loading, Metadata, Data Cube, Data Mart, Data Models, | 5 |
| 9. | Shell Programming | Shell Scripting Basics, Shell Variables, Shell Script Arguments, If Statement, Loop, Return, Basic UNIX commands | 5 |
| Total | | | 100 |

* Weightages are indicative only

Please note that Syllabus for Paper 2 of Phase II of Information Technology Stream shall be made available on SEBI website (www.sebi.gov.in) in due course.

Syllabus for Paper 2 of Phase I & Phase II in Engineering Stream - Civil
(Common Syllabus for both phases)

- 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 geo-synthetics.
- (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.

Syllabus for Paper 2 of Phase I & Phase II in Engineering Stream - Electrical **(Common Syllabus for both phases)**

- 1. Electrical Materials:** Electrical Engineering Materials, crystal structures and defects, ceramic materials, insulating materials, magnetic materials – basics, properties and applications; ferrites, ferro-magnetic 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, A/D 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 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, PID 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, basis 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.

Syllabus for Paper 2 of Phase I & Phase II in Research Stream
(Common Syllabus for both phases)

1. **Economics:** Demand and Supply, Market Structures, National Income, Determination of output and employment, Investment Function, Multiplier and Accelerator, Demand and Supply for Money, IS – LM, Inflation and Phillips Curve, Business Cycles, Inflation, Monetary and Fiscal Policy, Non-banking Financial Institutions.
2. **Public Economics:** Public Goods, Tax & Non-Tax Revenue, Direct & Indirect Taxes, Progressive and non-Progressive Taxation, Incidence and Effects of Taxation, Public expenditure, Public Debt, Public Budget and Budget Multiplier.
3. **Statistics and Econometrics:** Measures of Central tendency & dispersions, Correlation, Sampling methods, Sampling Distribution, Statistical Inferences, Hypothesis testing, Regression Analysis.
4. **International Economics:** Balance of Payments, Foreign Exchange Markets, Role of International Financial Institutions: BIS, IOSCO, IMF & World Bank.
5. **Financial Markets:** Asymmetric Information, Market Model, Market Efficiency, Primary Market, Secondary Market, Commodity Markets, Mutual Funds, Stock Exchanges, Depositories, Clearing Corporations, Credit Rating Agencies, Corporate Debt Market. Forwards, Futures, Options, Hedging, Speculation and Arbitrage.

Syllabus for Paper 2 of Phase I & Phase II in Official Language Stream
(Common Syllabus for both phases)

1. भारत सरकार की राजभाषा नीति (Official Language Policy of the Govt. of India) से संबंधित प्रश्न
2. हिन्दी से अंग्रेजी अनुवाद [शब्द / वाक्यांश / वाक्य / Terms / Phrases / Sentences]
3. अंग्रेजी से हिन्दी अनुवाद [शब्द / वाक्यांश / वाक्य / Terms / Phrases / Sentences]
4. हिन्दी से अंग्रेजी - विधिक शब्दावली (Legal Terminology)
5. अंग्रेजी से हिन्दी - विधिक शब्दावली (Legal Terminology)
6. हिन्दी से अंग्रेजी - प्रशासनिक / बैंकिंग / पूंजी बाजार संबंधी शब्दावली (Administrative / Banking / Capital Market Terminology)
7. अंग्रेजी से हिन्दी - प्रशासनिक / बैंकिंग / पूंजी बाजार संबंधी शब्दावली (Administrative / Banking / Capital Market Terminology)

Paper 1 of Phase- 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 including precis writing/ essay writing/ comprehension.