

- (f) Candidates will have to download the city and date intimations, e-call letters and travel authority (wherever applicable) from the links provided on the official web-sites of RRBs. Candidates should read the instructions on the e-Call Letter carefully and follow them scrupulously. Failure to comply with the instructions may lead to cancellation of their candidature.
- (g) Mock/Practice tests will also be made available on RRBs official website to the candidates to acquire familiarity with the online examination process.

13.1 1st Stage CBT (Common for all notified posts of this CEN):

Duration: 90 minutes (120 Minutes for candidates who are eligible for use of a Scribe)

No. of Questions: 100

The 1st stage CBT is of screening nature and the standard of questions for the CBT will be generally in conformity with the educational standards and/or minimum technical qualifications prescribed for the posts. The normalized score of 1st stage exam shall be used only for short listing of candidates for 2nd stage exam as per their merit. **Candidates who are shortlisted for 2nd stage CBT availing the reservation benefits of a community, PwBD and ExSM shall continue to be considered only against that community for all subsequent stages of recruitment process.** The Questions will be of objective type with multiple choices and are likely to include questions pertaining to:

a. Mathematics:

Number systems, BODMAS, Decimals, Fractions, LCM and HCF, Ratio and Proportion, Percentages, Mensuration, Time and Work, Time and Distance, Simple and Compound Interest, Profit and Loss, Algebra, Geometry, Trigonometry, Elementary Statistics, Square Root, Age Calculations, Calendar & Clock, Pipes & Cistern.

b. General Intelligence and Reasoning:

Analogies, Alphabetical and Number Series, Coding and Decoding, Mathematical operations, Relationships, Syllogism, Jumbling, Venn Diagram, Data Interpretation and Sufficiency, Conclusions and Decision Making, Similarities and Differences, Analytical reasoning, Classification, Directions, Statement – Arguments and Assumptions etc.

c. General Awareness:

Knowledge of Current affairs, Indian geography, culture and history of India including freedom struggle, Indian Polity and constitution, Indian Economy, Environmental issues concerning India and the World, Sports, General Scientific and technological developments etc.

d. General Science:

Physics, Chemistry and Life Sciences (up to 10th Standard CBSE syllabus).

The section wise Number of questions and marks are as below:

Subjects	No. of Questions	Marks for each Section
	CBT-I	CBT-I
Mathematics	30	30
General Intelligence & Reasoning	25	25
General Awareness	15	15
General Science	30	30
Total	100	100
Time in Minutes	90	

- The section wise distribution given in the above table is only indicative and there may be some variations in the actual question papers.
- There shall be negative marking in CBT (Computer Based Test/Examination) and marks shall be deducted for each wrong answer @ 1/3 of the marks allotted for each question.
- Minimum percentage of marks for eligibility in various categories:** UR -40%, EWS-40%, OBC(NCL)-30%, SC-30%, ST -25%. This is also applicable to Ex-servicemen candidates, as per their community. These percentage of marks for eligibility may be relaxed by 2 marks for PwBD candidates in case of shortage of PwBD candidates against vacancies reserved for them.

13.2nd Stage CBT:

Short listing of Candidates for the 2nd Stage CBT exam shall be based on the normalized marks obtained by them in the 1st Stage CBT Exam. Total number of candidates to be shortlisted for 2nd Stage shall be **15 times** the community wise total vacancy of Posts notified against the RRB as per their merit in 1st Stage CBT. However, Railways reserve the right to increase/decrease this limit in total or for any specific category(s) as required to ensure availability of adequate candidates for all the notified posts.

Duration: 120 minutes (160 Minutes for candidates who are eligible for use of a Scribe)

No of Questions: 150

Syllabus: The Questions will be of objective type with multiple choices and are likely to include questions pertaining to General Awareness, Physics and Chemistry, Basics of Computers and Applications, Basics of Environment and Pollution Control and Technical abilities for the post. The syllabus for General Awareness, Physics and Chemistry, Basics of Computers and Applications, Basics of Environment and Pollution Control is common for all notified posts under this CEN as detailed below:

a) General Awareness:

Knowledge of Current affairs, Indian geography, culture and history of India including freedom struggle, Indian Polity and Constitution, Indian Economy, Environmental issues concerning India and the World, Sports, General Scientific and Technological Developments etc.

b) Physics and Chemistry: Up to 10th standard CBSE syllabus.

c) Basics of Computers and Applications:

Architecture of Computers; input and Output devices; Storage devices, Networking, Operating System like Windows, Unix, Linux; MS Office; Various data representation; Internet and Email; Websites & Web Browsers; Computer Virus.

d) Basics of Environment and Pollution Control:

Basics of Environment; Adverse effect of environmental pollution and control strategies; Air, water and Noise pollution, their effect and control; Waste Management, Global warming; Acid rain; Ozone depletion.

e) Technical Abilities:

The educational qualifications mentioned against each post shown in Annexure A, have been grouped into different exam groups as below. Questions on the Technical abilities will be framed in the syllabus defined for various Exam Groups given at Annexure VIII- (A), (B), (C) & (D).

The section wise Number of questions and marks are as below:

Subjects	No. of Questions	Marks for each Section
	CBT-II	CBT-II
General Awareness	15	15
Physics & Chemistry	15	15
Basics of Computers and Applications	10	10
Basics of Environment and Pollution Control	10	10
Technical Abilities	100	100
Total	150	150
Time in Minutes	120	

- The section wise distribution given in the above table is only indicative and there may be some variations in the actual question papers.
- There shall be negative marking in CBT (Computer Based Test/Examination) and marks shall be deducted for each wrong answer @ 1/3 of the marks allotted for each question.
- Minimum percentage of marks for eligibility in various categories:** UR-40%, EWS-40%, OBC(NCL)-30%, SC-30%, ST-25%. This is also applicable to Ex-servicemen candidates, as per their community. This percentage of marks for eligibility may be relaxed by 2 marks for PwBD candidates, in case of shortage of PwBD candidates against vacancies reserved for them.
- Virtual calculator will be made available on the Computer Monitor during 2nd Stage CBT.**

Syllabus for Civil & Allied Engineering Exam Group – JE

S.N.	Subject
1	Engineering Mechanics- Force (resolution of force, moment of force, force system, composition of forces), Equilibrium, Friction, Centroid and Center of gravity, Simple machines.
2	Building Construction- Building components (substructure, superstructure), type of structure (load bearing, framed and composite structures).
3	Building materials- Masonry materials (stones, bricks, and mortars), Timber and miscellaneous materials (glass, plastic, fiber, aluminium steel, galvanized iron, bitumen, PVC, CPVC, and PPF).
4	Construction of substructure- job layout, earthwork, foundation (types, dewatering, coffer dams, bearing capacity).
5	Construction of superstructure- stone masonry, brick masonry, Hollow concrete block masonry, composite masonry, cavity wall, doors and windows, vertical communication (stairs, lifts, escalators), scaffolding and shoring.
6	Building finishes- Floors (finishes, process of laying), walls (plastering, pointing, painting) and roofs (roofing materials including RCC).
7	Building maintenance- Cracks (causes, type, repairs- grouting, guniting, epoxy etc.), settlement (causes and remedial measures), and re-baring techniques.
8	Building drawing- Conventions (type of lines, symbols), planning of building (principles of planning for residential and public buildings, rules and byelaws), drawings (plan, elevation, section, site plan, location plan, foundation plan, working drawing), perspective drawing.
9	Concrete Technology- Properties of various types/grades of cement, properties of coarse and fine aggregates, properties of concrete (water cement ratio, properties of fresh and hardened concrete), Concrete mix design, testing of concrete, quality control of concrete (batching, formwork, transportation, placing, compaction, curing, waterproofing), extreme weather concreting and chemical admixtures, properties of special concrete (ready mix, RCC, pre-stressed, fiber reinforced, precast, high performance).
10	Surveying- Types of survey, chain and cross staff survey (principle, ranging, triangulation, chaining, errors, finding area), compass survey (principle, bearing of line, prismatic compass, traversing, local attraction, calculation of bearings, angles and local attraction) leveling (dumpy level, recording in level book, temporary adjustment, methods of reduction of levels, classification of leveling, tilting level, auto level, sources of errors, precautions and difficulties in leveling), contouring (contour interval, characteristics, method of locating, interpolation, establishing grade contours, uses of contour maps), area and volume measurements, plane table survey (principles, setting, method), theodolite survey (components, adjustments, measurements, traversing), Tacheometric survey, curves (types, setting out), advanced survey equipment, aerial survey and remote sensing.
11	Computer Aided Design- CAD Software (AutoCAD, Auto Civil, 3D Max etc.), CAD commands, generation of plan, elevation, section, site plan, area statement, 3D view.
12	Geo Technical Engineering- Application of Geo Technical Engineering in design of foundation, pavement, earth retaining structures, earthen dams etc., physical properties of soil, permeability of soil and seepage analysis, shear strength of soil, bearing capacity of soil, compaction and stabilization of soil, site investigation and sub soil exploration.
13	Hydraulics- properties of fluid, hydrostatic pressure, measurement of liquid pressure in pipes, fundamentals of fluid flow, flow of liquid through pipes, flow through open channel, flow measuring devices, hydraulic machines.
14	Irrigation Engineering- Hydrology, investigation and reservoir planning, percolation tanks, diversion head works.
15	Mechanics of Structures- Stress and strain, shear force and bending moment, moment of inertia, stresses in beams, analysis of trusses, strain energy.
16	Theory of structures- Direct and bending stresses, slope and deflection, fixed beam, continuous beam, moment distribution method, columns.
17	Design of Concrete Structures- Working Stress method, Limit State method, analysis and design of singly reinforced and doubly reinforced sections, shear, bond and development length, analysis and design of T Beam, slab, axially loaded column and footings.
18	Design of Steel Structures- Types of sections, grades of steel, strength characteristics, IS Code, Connections, Design of tension and compression members, steel roof truss, beams, column bases.
19	Transportation Engineering- Railway Engineering (alignment and gauges, permanent way, railway track geometrics, branching of tracks, stations and yards, track maintenance), Bridge engineering (site selection, investigation, component parts of bridge, permanent and temporary bridges, inspection and maintenance), Tunnel engineering (classification, shape and sizes, tunnel investigation and surveying, method of tunneling in various strata, precautions, equipment, explosives, lining and ventilation).
20	Highway Engineering- Road Engineering, investigation for road project, geometric design of highways, construction of road pavements and materials, traffic engineering, hill roads, drainage of roads, maintenance and repair of roads.

21	Environmental Engineering- Environmental pollution and control, public water supply, domestic sewage, solid waste management, environmental sanitation, and plumbing.
22	Advanced Construction Techniques and Equipment- Fibers and plastics, artificial timber, advanced concreting methods (under water concreting, ready mix concrete, tremix concreting, special concretes), formwork, pre-fabricated construction, soil reinforcing techniques, hoisting and conveying equipment, earth moving machinery (exaction and compaction equipment), concrete mixers, stone crushers, pile driving equipment, working of hot mix bitumen plant, bitumen paver, floor polishing machines.
23	Estimating and Costing- Types of estimates (approximate, detailed), mode of measurements and rate analysis.
24	Contracts and Accounts- Types of engineering contracts, Tender and tender documents, payment, specifications.

Annexure-VIII (B)

Syllabus for Electrical & Allied Engineering Exam Group – JE	
S. N.	Subject
1	Basic concepts: Concepts of resistance, inductance, capacitance, and various factors affecting them. Concepts of current, voltage, power, energy and their units.
2	Circuit law: Kirchhoff's law, Simple Circuit solution using network theorems.
3	Magnetic Circuit: Concepts of flux, mmf, reluctance, Different kinds of magnetic materials, Magnetic calculations for conductors of different configuration e.g. straight, circular, solenoidal, etc. Electromagnetic induction, self and mutual induction.
4	AC Fundamentals: Instantaneous, peak, R.M.S. and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of R.L. and C, Resonance, Tank Circuit. Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of R-Land R-C circuit.
5	Measurement and measuring instruments: Measurement of power (1 phase and 3 phase, both active and re-active) and energy, 2 wattmeter method of 3 phase power measurement. Measurement of frequency and phase angle. Ammeter and voltmeter (both moving oil and moving iron type), extension of range wattmeter, Multimeters, Megger, Energy meter AC Bridges. Use of CRO, Signal Generator, CT, PT and their uses. Earth Fault detection.
6	Electrical Machines: (a) D.C. Machine – Construction, Basic Principles of D.C. motors and generators, their characteristics, speed control and starting of D.C. Motors. Method of braking motor, Losses and efficiency of D.C. Machines. (b) 1 phase and 3 phase transformers – Construction, Principles of operation, equivalent circuit, voltage regulation, O.C. and S.C. Tests, Losses and efficiency. Effect of voltage, frequency and wave form on losses. Parallel operation of 1 phase /3 phase transformers. Auto transformers. (c) 3 phase induction motors, rotating magnetic field, principle of operation, equivalent circuit, torque-speed characteristics, starting and speed control of 3 phase induction motors. Methods of braking, effect of voltage and frequency variation on torque speed characteristics, Fractional Kilowatt Motors and Single Phase Induction Motors: Characteristics and applications.
7	Synchronous Machines: Generation of 3-phase e.m.f. armature reaction, voltage regulation, parallel operation of two alternators, synchronizing, control of active and reactive power. Starting and applications of synchronous motors.
8	Generation, Transmission and Distribution: Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations. Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults. Switchgears and Protection: Rating of circuit breakers, Principles of arc extinction by oil and air, H.R.C. Fuses, Protection against earth leakage / over current, etc. Buchholz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars. Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system. Cable – Different type of cables, cable rating and derating factor.
9	Estimation and costing: Estimation of lighting scheme, electric installation of machines and relevant IE rules. Earthing practices and IE Rules.
10	Utilization of Electrical Energy: Illumination, Electric heating, Electric welding, Electroplating, Electric drives and motors.
11	Basic Electronics: Working of various electronic devices e.g. P N Junction diodes, Transistors (NPN and PNP type), BJT and JFET. Simple circuits using these devices.

Syllabus for Electronics & Allied Engineering Exam Group – JE

S.N.	Subject
1	Electronic Components & Materials: Conductors, Semi conductor & Insulators; Magnetic materials; Jointing & Cleaning materials for U/G copper cable & OFC; Cells and Batteries (chargeable and non chargeable); Relays, Switches, MCB & Connectors.
2	Electronic Devices and circuits: PN Junction diodes, thyristor; Diode and triode circuits; Junction Transistors; Amplifiers; Oscillator; Multivibrator, counters; Rectifiers; Inverter and UPS.
3	Digital Electronics: Number System & Binary codes; Boolean Algebra & Logic gates; Combinational & Sequential logic circuits; A/D & D/A converter, counters; Memories
4	Linear Integrated Circuit: Introduction to operational Amplifier; Linear applications; Non Linear applications; Voltage regulators; Timers; Phase lock loop.
5	Microprocessor and Microcontroller: Introduction to microprocessor, 8085 microprocessor working; Assembly Language programming; Peripherals & other microprocessors; Microcontrollers
6	Electronic Measurements: Measuring systems; Basic principles of measurement; Range Extension methods; Cathode ray oscilloscope, LCD, LED panel; Transducers
7	Communication Engineering: Introduction to communication; Modulation techniques; Multiplexing Techniques; Wave Propagation, Transmission line characteristics, OFC; Fundamentals of Public Address systems, Electronic exchange, Radar, Cellular and Satellite Communication.
8	Data communication and Network: Introduction to data communication; Hardware and interface; Introduction to Networks and Networking devices; Local Area Network and Wide area network; Internet working.
9	Computer Programming: Programming concepts; Fundamentals of 'C' and C ++; Operators in 'C' and C ++; Control Statements; Functions, Array String & Pointers, File Structure; Data Structure and DBMS
10	Basic Electrical Engg.: DC Circuits; AC fundamentals; Magnetic, Thermal and Chemical effects of Electric current; Earthing - Installation, Maintenance, Testing,

Syllabus for Mechanical & Allied Engineering Exam Group – JE

S. N.	Subject
1	Engineering Mechanics: Resolution of forces, Equilibrium and Equilibrant, parallelogram law of forces, triangle law of forces, polygon law of forces and Lami's theorem, couple and moment of a couple, condition for equilibrium of rigid body subjected to number of coplanar non-concurrent forces, definition of static friction, dynamic friction, derivation of limiting angle of friction and angle of repose, resolution of forces considering friction when a body moves on horizontal plane and inclined plane, calculation of moment of inertia and radius of gyration of : (a) I-Section (b) channel section (c) T-Section (d) L-Section (Equal & unequal lengths) (e) Z-Section (f) Built up sections (simple cases only), Newton's laws of motion (without derivation), motion of projectile, D'Alembert's principle, definition law of conservation of energy, law of conservation of momentum.
2	Material Science: Mechanical properties of engineering materials – tensile strength, compressive strength, ductility, malleability, hardness, toughness, brittleness, impact strength, fatigue, creep resistance. Classification of steels, mild steel and alloy steels. Importance of heat treatment. Heat treatment processes – annealing, normalizing, hardening, tempering, carburizing, nitriding and cyaniding.
3	Strength of Materials: Stress, strain, stress strain diagram, factor of safety, thermal stresses, strain energy, proof resilience and modules of resilience. Shear force and bending moment diagram – cant lever beam, simply supported beam, continuous beam, fixed beam. Torsion in shafts and springs, thin cylinder shells.
4	Machining: Working principle of lathe. Types of lathes – Engine lathe – construction details and specifications. Nomenclature of single point cutting tool, geometry, tool signature, functions of tool angles. General and special operations – (Turning, facing, taper turning thread cutting, knurling, forming, drilling, boring, reaming, key way cutting), cutting fluids, coolants and lubricants. Introduction to shaper, slotter, plainer, broaching, milling and manufacture of gears, heat treatment process applied to gears.

5	Welding – Introduction, classification of welding processes, advantages and limitations of welding, principles of arc welding, arc welding equipment, choice of electrodes for different metals, principle of gas (oxy-acetylene) welding, equipment of gas welding, welding procedures (arc & gas), soldering and brazing techniques, types and applications of solders and fluxes, various flame cutting processes, advantages and limitations of flame cutting, defects in welding, testing and inspection modern welding methods, (submerged, CO ₂ , atomic – hydrogen, ultrasonic welding), brief description of MIG & TIG welding.
6	Grinding & Finishing Process: Principles of metal removal by grinding, abrasives, natural and artificial, bonds and binding processes, vitrified, silicate, shellac rubber, grinding machines, classification: cylindrical, surface, tool & cutter grinding machine, construction details, relative merits, principles of centreless grinding, advantages & limitations of centreless grinding work, holding devices, wheel maintenance, balancing of wheels, coolants used, finishing by grinding, honing, lapping, super finishing, electroplating, basic principles – plating metals, applications, hot dipping, galvanizing tin coating, parkerising, anodizing, metal spraying, wire process, powder process and applications, organic coatings, oil base paint, lacquer base enamels, bituminous paints, rubber base coating.
7	Metrology: Linear measurement – Slip gauges and dial indicators, angle measurements, bevel protractor, sine bar, angle slip gauges, comparators (a) mechanical (b) electrical (c) optical (d) pneumatic. Measurement of surface roughness; methods of measurements by comparison, tracer instruments and by interferometry, collimators, measuring microscope, interferometer, inspection of machine parts using the concepts of shadow projection and profile projection.
8	Fluid Mechanics & Hydraulic Machinery: Properties of fluid, density, specific weight, specific gravity, viscosity, surface tension, compressibility capillarity, Pascal's law, measurement of pressures, concept of buoyancy. Concept of Reynold's number, pressure, potential and kinetic energy of liquids, total energy, laws of conservation, mass, energy and momentum, velocity of liquids and discharge, Bernoulli's equation and assumptions, venturi meters, pitot-tube, current meters. Working principle & constructional details of centrifugal pump, efficiencies – manometric efficiency, volumetric efficiency, mechanical efficiency and overall efficiency, cavitation and its effect, working principle of jet & submersible pumps with line diagrams.
9	Industrial Management: Job analysis, motivation, different theories, satisfaction, performance reward systems, production, planning and control, relation with other departments, routing, scheduling, dispatching, PERT and CPM, simple problems. Materials in industry, inventory control model, ABC Analysis, Safety stock, re-order, level, economic ordering quantity, break even analysis, stores layout, stores equipment, stores records, purchasing procedures, purchase records, Bin card, Cardex, Material handling, Manual lifting, hoist, cranes, conveyors, trucks, fork trucks.
10	Thermal Engineering: Laws of thermo dynamics, conversion of heat into work vice versa , laws of perfect gases, thermo dynamic processes – isochoric, isobaric, isothermal hyperbolic, isentropic, polytrophic and throttling, modes of heat transfer, thermal conductivity, convective heat transfer coefficient, Stefan Boltzman law by radiation and overall heat transfer coefficient. Air standards cycles – Carnot cycle, Otto cycle, Diesel cycle, construction and working of internal combustion engines, comparison of diesel engine and petrol engine. Systems of internal combustion engine, performance of internal combustion engines. Air compressors their cycles refrigeration cycles, principle of a refrigeration plant.
