(86)

SYLLABUS FOR DIRECT RECRUITMENT TO JE(CIVIL)

Paper	Subject	Marks	Duration
Paper-I	General Knowledge(50 questions)	100	3 hours with compensatory time of 20 minutes per hour for persons with benchmarked disabilities.
	General English (25 questions)	50	
	Essay Writing	30	
	English Comprehension	20	
	Total	**200**	
Paper-II	Basic Computer Knowledge(50 questions)	100	3 hours with compensatory time of 20 minutes per hour for persons with benchmarked disabilities.
	Simple Arithmetic(30 questions)	60	
	General Intelligence & Reasoning (20 questions)	40	
	Total	**200**	
Paper- III	Building Materials (25 questions)	50	3 hours with compensatory time of 20 minutes per hour for persons with benchmarked disabilities.
	Soil Mechanics and Foundation Engineering (25 questions)	50	
	Hydrology and rain water Harvesting (15 questions)	30	
	Design of RCC Building Members and RCC Water Tank (10 questions)	20	
	Protective Works, Slope stability and Land (25 questions)	50	
	Total	**200**	
Paper-IV	Estimating, Costing and Valuation (25 questions)	50	3 hours with compensatory time of 20 minutes per hour for persons with benchmarked disabilities.
	Transportation Engineering and Surveying (25 questions)	50	
	Environmental Engineering (10 questions)	20	
	Design of Steel Structures and Steel Water Tanks(10 questions)	20	
	Professional practices (15 questions)	30	
	Aptitude Test(15 questions)	30	
	Total	**200**	

Notes:

1) Questions shall be set in Objective Type Multiple Choice pattern only except for essay writing and English comprehension under Paper-I with all questions carrying equal marks and answers for each of the questions shall be marked using blue or black ball point pen. In other words, there shall be multiple probable answers (at least four) wherein the candidate has to choose the correct answer for every objective type question.
2) Questions will be set in tune with the level of educational qualifications prescribed in the corresponding Recruitment Rules/Service Rules for the post(s).

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3) A brief description of the common syllabus for direct recruitment to JE(Civil) is as follows:

Paper-I

General Knowledge: Questions will be designed to test the candidate's knowledge of current events and of such matters of everyday observation and experience as may be expected of an educated person. The test will also include questions relating to Indian history and culture, Indian polity including the Constitution of India, geography, economy and general science. Questions on Mizo history and culture will also form part of the syllabus.

General English: Questions in this components will be designed to test the candidates understanding and knowledge of English language and will be based on error recognition, fill in the blanks (using verbs, preposition, articles etc), vocabulary, spellings, grammar, sentence structure, synonyms, antonyms, sentence completion, phrases and idiomatic use of words etc.

Essay Writing: Question on essay writing will be designed to test the candidate's grasp of his material, its relevance to the subject chosen, and to his ability to think constructively and to present his ideas logically, constructively and concisely.

English Comprehension: There will be questions on comprehension of passages also to test the vocabulary, grammar, logical thought ability and overall grasp of the candidates over English language.

Paper-II

Basic Computer knowledge: Introduction to Computers, introduction to Graphical user interface based Operating System, elements of Word Processing, Spreadsheets, Power point presentations, Computer communication and internet, world wide web and web browser, communication and collaboration.

Simple Arithmetic: Number system, simplification, roots, averages, discounts, percentages, profit & loss, ratio and proportion, partnership, chain rule, time & work, time & distance, simple & compound interest, mensuration, permutations & combinations, heights & distances, line graphs, bar graphs, pie charts and tabulation.

General Intelligence & Reasoning: It would include questions of both verbal and non -verbal type. This component may include questions on analogies, similarities and differences, spatial visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetical reasoning and figural classification, arithmetic number series, non -verbal series, coding and decoding, statement conclusion, syllogistic reasoning etc

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Paper-III

1. Building Materials (50 Marks)

Physical and Chemical properties, Classification, Standard Tests, Uses and Types of materials:- Building stones, Bricks, silicate based materials, Cement and Mortars, Sand, Aggregates, Asbestos products, Timber and Wood based Products, Paints, Varnishes, Ferrous metals, Lubricants, Sealants for joints, Polymers and Plastics, Protective and decorative coatings.

2.Soil Mechanics and Foundation Engineering (50 Marks)

Origin of soil, phase diagram, Definitions- void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, Bearing capacity of soils, plate load test, standard penetration test. Foundation engineering:-Foundation classification, Different type and selection criteria of foundation type, Requirements for a stable foundation, Minimum depth for shallow foundation, Definitions of bearing capacity of soil, Type of failure of soil below foundation footing, Determination of size of foundation footings.

3.Hydrology and Rainwater harvesting- (30 Marks)

Hydrological cycle, Water budget equation, Precipitation :- forms, characteristics of precipitation on india, measurement, losses from precipitation. Run-off :- hydrograph, characteristics of streams, yield, droughts, surface water resources of india. Ground water :- forms, aquifer properties, geological formations as aquifers. Wells, Well losses, Specific capacity, Ground water capacity. Rainwater harvesting:- Definition of terms :- aquifer, artificial recharge, bore well, dry well, open wells, water table. Components of roof top rainwater harvesting and conservation system. Calculation of amount of rainwater that can be harvested from roof top. Design parameters for settlement tanks. General recommendations for rainwater harvesting. Quality of rainwater and method of treatment.

4.Design of RCC Building members and RCC water tanks (20 Marks)

Principles of Limit state method (LSM) and Working stress method of design, Provisions of IS:456 and IS:13920 (Latest version) :- -Materials, workmanship, inspection, testing, placing and requirement of reinforcement, requirement of cement, aggregates and water. Water/Cement ration. Characteristic load & Strength, Partial factor of safety, Stress-strain characteristic of concrete and steel, Limit state of Durability, limit state of collapse in flexure and shear, limit state of serviceability. Theory and design of singly reinforced members. Bond, anchorage, development length and splicing. Design and IS code provisions for short columns, one way and two way slabs, isolated footing. RCC water tanks :- Indian standard codes and provisions prescribed for designing water retaining structures, causes and control of cracking, joints in water retaining structures. Removal of formworks/shutters. Lining, lighting protection and ventilation of water tanks. Regular capacity and design capacity of water tanks. Classification and layout of elevated tanks. Nomenclature and functions of ancillary items of water retaining structures. Components of water retaining structures.

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(59)

5.Protective works, Slope stability and Landslide correction (50 Marks)

Design, construction, specifications and uses of Retaining walls, Breast walls, Toe walls, Crib walls and Revetment walls. Classification of slope movement. Causes of slope movement. Landslide investigations. Stability analysis, corrective measures and design considerations

PAPER-IV

1.Estimating, Costing and Valuation (50 Marks)

Estimate, Glossary of technical terms, Analysis of rates, Methods and unit of measurement, Items of work – Earthwork, Brick work (Modular & Traditional bricks), RCC work, Shuttering, Timber work, Painting, Flooring, Plastering. Boundary wall, Brick building, Water Tank, Septic tank, Bar bending schedule. Centre line method, Mid-section formula, Trapezodial formula, Simpson's rule. Cost estimate of Septic tank, flexible pavements, Tube well, isolated and combined footings, Steel Truss, Piles and pile-caps. Valuation – Value and cost, scrap value, salvage value, assessed value, sinking fund, depreciation and obsolescence, methods of valuation.

2.Transportation Engineering and Surveying (50 Marks)

Highway Engineering – cross sectional elements, geometric design, types of pavements, pavement materials – aggregates and bitumen, different tests, Construction and specifications of : – Granular Sub-Base (GSB), Water Bound Macadam (WBM) and Wet Mix Macadam (WMM), Gravel Road, Bituminous construction. Rigid pavement joint, Type of pavement distresses and maintenance. Highway drainage. Traffic Engineering : – Traffic signals, traffic operation, traffic signs and markings, road safety. Surveying: Principles of surveying, measurement of distance, chain surveying, working of prismatic compass, compass traversing, bearings, local attraction, plane table surveying, theodolite traversing, adjustment of theodolite, Levelling, Definition of terms used in leveling, contouring, curvature and refraction corrections, temporary and permanent adjustments of dumpy level, methods of contouring, uses of contour map, tachometric survey, curve setting, earth work calculation, advanced surveying equipment.

3.Environmental Engineering (20 Marks)

Quality of water, source of water supply, purification of water, distribution of water, need of sanitation, sewerage systems, circular sewer, oval sewer, sewer appurtenances, sewage treatments. Surface water drainage. Solid waste management – types, effects, engineered management system. Air pollution – pollutants, causes, effects, control. Noise pollution – causes, health effects, control.

4.Design of Steel structures and Steel water tanks (20 Marks)

Riveted and Bolted joints :- types and definitions. Riveted joints :- assumptions in the theory. Failures, strength and efficiency. Design of riveted joints for axially loaded members. Welded joints :- processes, types and symbols, advantages and disadvantages. Terms used in the design of fillet welds and butt welds. Compression members :- effective length, maximum slenderness ratio, typical cross-section, design of compression members. Steel tanks :- Types of steel tanks commonly used, accessories commonly required, pressed steel tanks.

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(60)

5.Professional practices (30 Marks)

Schedule of works, Schedule of rates (SOR), Analysis of rates, Technical specifications, Cost indices. Stages for execution of works :- administrative approval, expenditure sanction, technical sanction, deviations, extra and substituted items, contingencies, work charged establishment, Types of estimate. Tendering and Agreement :- sale, opening and acceptance of tenders, earnest money, performance guarantee, security deposit, extension of time, liquidated damage, advance payment to contractors. Measurement book :- writing, recording, testing of measurement, loss of measurement book. Contract :- definition, essential elements of a valid contract, offer and acceptance. Free consent (Definition and consequences) :- coercion, undue influence, fraud, mis-representation, mistake. Special contracts :- indemnity, guarantee, bailment and pledge, agency.

6. Aptitude Test (30 Marks)

(a) Numerical And Figurework Tests: (8 Marks)
These tests are reflections of fluency with numbers and calculations. It shows how easily a person can think with numbers. The subject will be given a series of numbers. His/Her task is to see how the numbers go together to form a relationship with each other. He/She has to choose a number which would go next in the series.

(b) Verbal Analysis And Vocabulary Tests: (8 Marks)
These tests measure the degree of comfort and fluency with the English language. These tests will measure how a person will reason with words. The subject will be given questions with alternative answers, that will reflect his/her command of the rule and use of English language.

(c) Visual And Spatial/3-D Ability Tests: (6 Marks)
These tests are used to measure perceptual speed and acuity. The subject will be shown pictures where he/she is asked to identify the odd one out; or which comes next in the sequence or explores how easily he/she can see and turn around objects in space.

(d) Abstract Reasoning Tests: (8 Marks)
This test measures the ability to analyse information and solve problems on a complex, thought based level. It measures a person's ability to quickly identify patterns, logical rules and trends in new data, integrate this information, and apply it to solve problems.

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