**SYLLABUS FOR DIRECT RECRUITMENT TO SA UNDER PWD**

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| **Paper** | **Subject** | **Marks** | **Duration** |
| Paper-I | General Knowledge (25 questions) | 50 | 3 hours with additional time of 20 minutes for Visually handicapped/ Cerebral palsy candidates |
| General English ( 20 questions) | 40 |
| Essay writing | 20 |
| English Comprehension | 20 |
| Simple Arithmetic (20 questions) | 40 |
| Basic Computer Knowledge (15 question) | 30 |
| **Total** | **200** |
| Paper-II | Building Materials (25 questions) | 50 | 3 hours with additional time of 20 minutes for Visually handicapped/ Cerebral palsy candidates |
| Soil Mechanics and Foundation Engineer (25 question) | 50 |
| Hydrology and rain water Harvesting (25 questions) | 50 |
| Protective Works, Slope stability and Land (25 questions) | 50 |
| **Total** | **200** |
| Paper-III | Transportation Engineering and Surveying (25 questions) | 50 | 3 hours with compensatory time of 20 minutes per hour for person with benchmarked disabilities |
| Environmental Engineering (25 questions) | 50 |
| Professional practices (25 questions) | 50 |
| Aptitude Test (25 questions) | 50 |
| **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. Overmarking / overwriting answer shall be considered as wrong answer.

1. Questions will be set in tune with the level of educational qualifications prescribed in the corresponding Recruitment Rules/Service Rules for the post(s).
2. A brief description of the common syllabus for direct recruitment to SA is as follows:

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**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.

**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.

**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.

**Paper-II**

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- (50 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.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.

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**Paper-III**

1. **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.

1. **Environmental Engineering (50 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.

1. **Professional practices (50 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.

1. **Aptitude Test (50 Marks)**

**(a) Numerical And Figurework Tests: (15 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: (15 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: (10 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: (10 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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