

SYLLABUS FOR WRITTEN TEST FOR RECRUITMENT TO THE POST OF SUB-ASSISTANT ENGINEERS (CIVIL) under Zilla Parishad

The examination for recruitment of Sub- Assistant Engineer under Zilla Parishad shall be conducted in two stages viz. (A) Written examination, (B) Interview. Final merit list will be prepared on the basis of total marks obtained by the candidates in the written examination and interview.

(A) The written examination will consist of one paper for all candidates. The question paper will be of objective type (multiple choices) comprising 45 questions. Full marks will 85 for 45 questions, for 40 questions of 2 marks in each and 5 questions of 1 mark in each. The paper will be of 1 hour 30 minutes duration.

(B) Interview- the full marks of interview will be 15.

Course /Syllabus
Marks

Marks

1. STRENGTH OF MATERIALS

Simple stresses & strains, stress-strain curve for Mild Steel, S.F. and B.M. diagrams of loaded beams, Bending & Shear stresses of beams, slope and deflection, direct & bending stress, Eccentric loading on masonry pillars.

5 x 2=10

2. THEORY OF STRUCTURES

Gravity structures – Dams & Retaining Walls (Rectangular & Trapezoidal sections), conditions of stability, Different types of failure of a Dam, Critical load on Columns – Euler's, Rankine's & B.I.S. Code formula.

CONCRETE STRUCTURES

Working stress method of design of simply supported R.C.C. rectangular beams , Cantilever slabs, singly reinforced T-Beams - Design of Reinforcements, Design of axially loaded R.C.C. short columns, Isolated R.C.C. square footing of column.

5 x 2=10

3. CONSTRUCTION MATERIALS & PRACTICE BUILDING MATERIALS

Bricks - Traditional & Modular, Size & Weight, I.S. Classifications, Testing of Bricks, Mortar & Concrete - different types, Usual proportions, Specific uses, Slump of concrete, Recommended values of slump for various works, Water-Cement ratio - its effect on strength of concrete, Curing of concrete, Sources and uses of stone, Sand & lime, Mosaic Tiles & Roof Tiles, Period of curing timbers, Commonly used timber in engineering works & their specific uses.

CONSTRUCTION

Foundation, Object, Shallow & Deep Foundation, Names of different types, their uses in specific locations, Brick Masonry works, General principles & precautions, reinforced brick work, its advantages, damp proofing - materials used, causes & effect of dampness, roofs and roof coverings - different types - uses at specific locations, flooring, doors & windows - different types - uses at specific locations, Stairs, different types (names only), their uses. Formwork - materials used, characteristics of good formwork, rules for removal of formwork, Common construction equipments.

5 x 2=10

4. FIELD SURVEYING

Metric surveying chain, types - different types, uses, Triangulation and Traversing, Tie line, Check line & Base line offsets - different types, Field book entry, Right angle setting in field with instruments and with chain or tape.

Compass - different types, uses, bearing, W.C.B. & R.B., Fore & Back bearing, Local attraction, Declination, Dip, closing error of a compass traverse, causes, adjustment, permissible error in compass surveying.

Plane Table survey - suitability, advantages & disadvantages, methods of plane tabling, equipments necessary.

Levelling, types of level & leveling staff (names only), temporary adjustment of level, reduction of level, level book entry, reciprocal and profile levelling, correction for curvature & refraction, contouring, definition of contour, contour interval & horizontal equivalent, characteristics of contour lines, uses of contour map, methods of contouring (names only).

Theodolite Survey - different types of theodolite, important terms in connection with theodolite, uses of a theodolite, theodolite traversing, latitude & departure, closing error in a theodolite traverse, adjustments, permissible limits of error.

Curve setting - degree & radius of a curve, their inter-relation, elements of a simple curve, classification of curves.

5 x 2=10

5. ESTIMATING, COSTING & CONTRACTS

Specification of works and materials, Estimates, different Types, general items of works, Units of measurement for building works as per I.S. Code, method of measurement for different items of work and materials, present market rates of materials & unit rate of items of work, floor area, carpet area and plinth area, F.A.R., Rate analysis - factors governing it, schedule of rates, analysis of rates for different items of works of a building.

Contracts - different types, Contract documents, submission & opening of Tender, earnest money, security deposit, measurement book, work order book, imprest and temporary advance, material at site account, suspense account.

5 x 2=10

**6. PUBLIC HEALTH ENGINEERING
WATER SUPPLY**

Sources of water, ground water (springs, infiltration galleries & wells), Aquifer, Tube-wells - methods of boring, development of Tube-well, determination of tube diameter, length and diameter of a strainer, Motor & Hand Pump. Water requirements per capita demand, domestic, industrial & fire demands, population forecast.

5 x 1=5

7. IRRIGATION

PRINCIPLES OF IRRIGATION

Necessity & benefits of irrigation - its ill effects, types of irrigation systems, methods of irrigation - surface irrigation, sprinkler irrigation and sub-surface irrigation.

HYDROLOGY

Measurement of rainfall - Symon's rain gauge, average rainfall over an area by arithmetical mean method, Thiessen polygon method and Isohyetal method, Run off - factors affecting it.

WATER REQUIREMENT OF CROPS

Duty, Delta and base period - their inter-relations, factors affecting duty, methods of improving duty, commanded area, capacity factor, time factor, outlet factor, crop ratio, overlap allowance.

CANALS

Classification of canals, canal linings - Types and advantages, different parts of irrigation canals - their functions, designs of canal sections for a given discharge (using Kennedy & Kutter's formula), Design of canal sections by using Manning Formula, Canal structures.

WELL IRRIGATION

Shallow and deep wells, yield from a well, advantages & disadvantages of well irrigation.

TUBEWELL IRRIGATION

Piped Water Irrigation, Design of Pipelines and losses.

CROSS DRAINAGE WORKS

Aqueduct, super passage, siphon aqueduct, level crossing.

HEAD WORKS

Object, layout and functions of head works, classification of dams, different types of earthen dams, causes of failure of earthen dams and safety measures, difference between weir, barrage and dams.

FLOOD CONTROL

Methods of flood control, reservoirs, flood walls, channel improvements, floodways, Cause & effect of flood.

RIVER TRAINING WORKS

Objectives, different types, guide bank, spurs, groynes, pitching, revetment, rip-rap. $5 \times 2 = 10$

8. RURAL ROADS

INTRODUCTION

Classification of rural roads as per I.R.C., terrain classification as per I.R.C.

ROAD GEOMETRICS

Road alignment, vertical and horizontal curves. Cross-sectional elements, recommended land width for different classes of roads, recommended speeds, Camber-objective-recommended values of camber for different types of roads, Gradients for roads in different terrains, Grade compensation at curves on hill roads, super-elevation-objects, transition curves objects, sight distance, different types, perception time, brake-reaction time, lag time, lag distance. Equipments used in road construction.

EARTH WORK - Cutting, filling angle of repose, allowance for settlement, profile, benching, lead & lift, borrow pit & spoil bank.

ROAD AGGREGATES

Different types, requirements of good road aggregates, testing of road aggregates (names of tests & their objectives).

RURAL ROADS CONSTRUCTION

Road structure, component parts, functions, soil stabilization methods, Road Drainage.

Water bound macadam roads - materials required - advantages & disadvantages. Bitumen - sources - types, Asphalt, Tar.

Bituminous Road Types - Surface dressing (single & double coat), Grouting (semi grout & full grout), premix type (premix chipping carpet, premix macadam & premix concrete) - Functions, constructions, quantities of materials required for each type.

Cement concrete Roads : Pavement joints, necessity types, joint sealer, joint filler, dowel bar, tie bar, mud pumping,

Culverts & Bridges - differences - component parts - wing wall, Abutment and Piers.

Classification of Bridges, Span, Flood discharge, Waterway, Scouring, Depth of Foundation, Clearance and Free Board, Maintenance of Bridges.

5 x 2 = 10

9. SOIL MECHANICS & FOUNDATION ENGINEERING

Classification of soil.

Index, properties of soil.

Phase diagram for dry, moist and saturated soil, Definition - void ratio, porosity, water content, degree of saturation, Unit weight, Sp. Gr., Density, bulk density, dry density, submerged density, air content etc.

Consistency of soil - Moisture content & volume relationship, Definition - Atterberg Limit, plasticity index, density index shrinkage ratio.

Permeability of soil - Darcy's law, coeff of permeability, factors affecting permeability.

Compaction - Dry density by Proctor's compaction.

Consolidation - Difference between compaction & consolidation, compression index, coeff of compressibility, volume compressibility, coeff of consolidation, settlement of foundation.

Shear strength - Definition of shear strength and shear parameters.

Earth Pressure - Active and passive earth pressure, coeff of passive earth pressure - Rankine's earth pressure theory, Angle of repose, pressure intensity diagram, Resultant thrust.

Foundations - Shallow & deep foundations, types of shallow foundation (names & uses only) types of deep foundation (names & uses only), Bearing capacity, Terzaghi's bearing capacity formula, assumptions & problems, plate load test. Pile foundation - formula related to pile foundation, Dynamic

Engineering News formula, Hiley's formula, static formula.

Soil Stabilization - Principles, types - Mechanical stabilization, cement stabilization, lime stabilization, bitumen, stabilization by grouting.

5 x 2 = 10

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10/9/15

S. E. P. RD (H&A)