In pursuance of recruitment of Junior Engineer (Civil) on contract basis in APH&WCL for information's to candidates.

1. The syllabus of the written examination will be as per syllabus (technical) part of APPSC Junior Engineer (Civil) Examination-2025 **(Enclosed at Annexure-G)**
2. The paper of written examination shall consist of 100 marks MCQ and negative marking against wrong answer shall be awarded.

27/3/26

Police Housing & Welfare Corporation Ltd. Arunachal
Date: 27-3-26
Itanagar

Annexure - G

JUNIOR ENGINEER

SYLLABUS: CIVIL ENGINEERING

PART- I and II

1. **Measurements:**

   Area and Volume, Force and Energy, Pressure, Velocity, density, length and square measure, metric measure of (liquid, volume, weight)

2. **Surveying:**

   Chain survey, plane table survey, compass survey, leveling and contour survey, and theodolite survey.

3. **Strength of Materials:**

   Definition of determinate and indeterminate structure, calculation of reaction, bending moment and shear force of simple determinate structure, stress, strains, elasticity, impact, moment of inertia, Newton's Laws of Motion, forces of motion, friction, velocity, acceleration due to gravitational forces.

4. **Soil Mechanics and Foundation:**

   Engineering Properties of soil, calculation of bearing capacity of soil, various types of foundation, causes of failure of foundation and remedial measures, design of foundation, design of isolated footing.

5. **General Masonry (Design G Construction):**

   Safe permissible loads on masonry, design of retaining and breast walls, abutments, wing wall, and toe walls, causes of failure of retaining wall, and remedies.

6. **R.C.C. Structure:**

   Theory of reinforced concrete, properties and strength of concrete, requirements of structural concrete and reinforcing steel, shearing and anchorage, cutting and bending of bars, concrete covering to reinforcement, physical properties of the concrete and material for the concrete mix, curing of concrete, limit state design principles for RCC slabs, beams, and columns.

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7. Hydraulics:

Hydraulics data, general principle of measurement of discharge through notches, orifices, weirs, flow formulas for open channels, drains and pipes, Chezy, Bazin, Manning, Kotter, Hazen-William's formulae for calculation of maximum discharge, Bernoulli's Theorem of Hydraulic gradients, and different kinds of head loss.

8. Water Supply:

i. Drinking water qualities: common impurity effects and remedial measures, hard and soft waters. Different types of sources of water and its extraction.

ii. Water Purification Treatment: Storage settling basins, sedimentation tanks, coagulation, flocculation, sterilization, chlorination, colour and taste removal, filtration, slow sand filters, negative head, rapid sand aeration, monitoring, and analysis of water quality.

iii. Storage of Water: pure water storage and service reservoirs, domestic storage tanks, elevated and underground tanks, pressure equalizing reservoirs, cisterns, simple design of water storage tanks.

iv. Distribution of Water: consumption and demand of water for domestic and public purposes; leakage and wastage of water and its prevention methods; different methods of distribution; boosting water gravity and pressure. Distribution of storage tanks, design of mains, taps, economical velocities of mains and distribution pipes, service connections from mains, house services design, fittings, fire hydrants, and stand posts, design of distribution system—losses of pressure in a distribution system. Intermittent and constant systems of supply, laying and testing of new pipelines, corrosion of water mains, various fittings, water taps, and valves.

v. Pipes of Different Metals: Choice of materials for piping like cast-iron, steel, wrought iron, galvanized, lead, copper, cement concrete, and asbestos pipes.

vi. Pumping water, suction and delivery pipes, water pumps: types of pumps, pumps used in various classes of water works and engineering services, power for working pumps, diesel, gasoline, electric, efficiency tests of pumps, fuel required

for plants, centrifugal, turbine, reciprocating pumps.

vii. Design of Pumping Stations, Groundwater, and Wells: Water-bearing strata, measurements of velocity of flow of groundwater, yields of the wells, tests for yield of a well, construction of tube-wells, ring wells, methods of boring, strainers, household tube wells, open wells, well linings, and cavity wells.

9. Drainage:

i. Surface Drainage and Runoff: Calculation of catchment areas, surface runoff for design of drainage.

ii. Design of Town Drains C Sewers: systems of drainage, combined and separate systems, open drains in small towns, shape of street drains, size of sewers. Storm water flow, rainfall data, self-cleansing velocity, domestic drains, flushing of drains C sewers, design of drains.

iii. House Drainage: Different systems of plumbing for building drainage, one and two pipe systems, sanitary fixtures, traps, inspection chambers, house drains, anti-siphonage vent pipe, toilet, sizes of pipes and traps for house drains, testing drainage pipes for leakage, smoke test, water test, different types of pipes, soil rainwater pipes. Flushing pipes, sanitary latrines, water-sealed latrines, septic tanks and soak pits.

iv. Plumbing and internal fixtures, joints for various kinds of pipes.

v. Household Disposal Work: Septic tanks, disposal of effluent from septic tanks.

vi. Cesspools and seepage pits, simple designs.

10. Timber Structures:

Structural properties of timber, seasoning of timber, decay and its preservation, types and classification of timber trusses, beams.

11. Steel Structure:

Structural properties of steel and limit state design of simple beams, columns, tension and compression members, loading for design of roof truss, different types of roof truss, and design of truss members.

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12. Roads and Bridges:

Cross drainage, culverts, guidelines for location and alignment of bridges, type of bridge foundations, abutments, and wing walls.

13. Estimate G Costing:

Rate analysis of items of work, analysis of cost of transportation of materials, calculation of detailed quantities of items of work, estimation of cost of projects.

14. Highway and Transportation Engineering:

Classification of roads, alignment of roads, geometric designs of roads and factors governing geometric design, ruling gradients, exceptional gradient on curves, hairpin bend, camber, design of curves, superelevation, types of pavements, components of pavement and factors governing design of pavement, method of construction of embankment, water-bound macadam, wet-mixed macadam, and bituminous macadam. Introduction to Hill Road and Hill Road drainage system.

15. Introduction to Earthquake Engineering:

Earthquake, cause of earthquake, terminology of earthquake engineering such as focus, epicentre, magnitude, intensity, seismic zoning map of India, detailing of beam and column.

16. Flood Control Structures and River Training Works:

Structural and non-structural measures to mitigate flood, flood control structures like guide bund, marginal bund, spur, revetment, etc. Design flood, flood forecasting, and flood warning.