



অসম লোকসেৱা আয়োগ
ASSAM PUBLIC SERVICE COMMISSION

Jawaharnagar, Khanapara, Guwahati-781022.

S Y L L A B U S
(Bachelor Degree Standard)

**Recruitment to the post of Assistant Engineer (Civil) under Water Resources
Department**

(Advt. No. 22/2022 dated 2nd December, 2022)

PAPER-II

Civil Engineering
(Multiple Choice Question Type)

Full Marks: 100 Marks

Time: 2-00 hours

1. Structural Engineering

- (i) Engineering Mechanics: Simple stress and strain; analysis of plane stress and plane strain; Mohr’s circle of stress and strain; bending moment and shear force; simple bending theory; flexural and shear stresses; columns and struts; uniform torsion.
- (ii) Structural Analysis: Determinate and indeterminate structures; analysis of beams, trusses, arches, cables and frames; deflection in beams; moment distribution method slope deflection method; conjugate beam method; rolling loads and influence lines.
- (iii) Construction Materials, Practices and Management: Building materials- stone, sand, timber, bricks, cement, structural steel, paints; concrete, technology- cement its properties, classification and specification, provisions in I.S. code, properties of coarse and fine aggregates, production of fresh concrete, concrete mix design; detailing of walls, floors, roofs, ceilings, doors and windows, stair cases; construction management; types of construction projects; rate analysis and standard specifications; cost estimation; project planning and network analysis- PERT and CPM.
- (iv) Design of Concrete Structure: Working stress, limit state and ultimate load design concepts; design of simple and continuous beams, slabs, columns, footings; principles of prestressed concrete design, materials, methods of prestressing, losses in prestressing, anchorages.

2. Engineering Surveying

Classification of surveys; principles of surveying; scales; errors and their adjustment; distance and angle measurement; levelling and trigonometric levelling traversing and triangulation survey; total station.

3. Water Resources Engineering

- (i) Fluid Mechanics and Hydraulic Engineering: Fluid properties and definitions; fluid statics- hydrostatic pressure, measurement of pressure, pressure on submerged surfaces, buoyancy; fluid kinematics; continuity momentum and energy equations applicable to fluid flow; viscous flow; flow in pipes; pipe networks; concept of boundary layer and its growth; dimensional analysis and hydraulic similitude; open channel flow- uniform flow, energy-depth relationships, specific energy, critical flow, gradually varied flow, hydraulic jump; basics of hydraulic machines- pumps and turbines.
- (ii) Hydrology and Flood Management: Hydrology cycle; precipitation; evaporation; evapotranspiration; infiltration; watershed; Runoff components; hydrograph and its components; unit hydrograph; stream-flow measurement; occurrence of ground water; soil-water relationship; aquifers; application of Darcy's law; yield from wells for confined and unconfined aquifers; flood estimation- rational, empirical and unit hydrograph methods, design flood; Flood routing- definition, reservoir routing and channel routing; flood damage mitigation and river training works; dams and embankments- elements of gravity, arch and earth dams.
- (iii) Irrigation Engineering: Crop water requirements; duty; delta; estimation of evapo-transpiration; types of irrigation systems and irrigation methods; design of lined and unlined canals; heads works; design of weirs on permeable foundation; water logging and drainage; canal regulatory works- cross-drainage structures, outlets and escapes.

4. Environmental Engineering

- (i) Water Supply Engineering: Water uses; quantity requirements; sources of water-surface and subsurface sources and their characteristics; water quality; drinking water standards; treatment of water- sequence of treatments, aeration, sedimentation, coagulation and flocculation, filtration, disinfection, hardness and chemical softening, base exchange process; principles and methods of design of distribution systems.
- (ii) Waste Water Engineering: Quantity of sanitary sewage; sewerage systems and their design principles; sewer construction materials; sewer appurtenances; characteristics of domestic sewage; waste water treatment-methods and their sequence, preliminary treatment, primary treatment, secondary treatment; waste water disposal.
- (iii) Introduction to air pollution, noise pollution and solid waste.

5. Transportation Engineering

Highway alignment and engineering surveys; geometric design of highways- cross-sectional elements, gradients, super-elevation, camber, sight distances, horizontal and vertical curves, transition curves, grade separations; highway materials- desirable properties and quality control tests; pavement design-types of pavement, design factors for flexible and rigid pavements, Indian Road Congress method of design; traffic engineering- traffic volume studies and characteristics, speed and delay studies, origin-destination studies, parking studies, traffic accident studies, traffic capacity, traffic signs and markings, traffic signals and its classification, traffic channelization-islands and its design, road intersections, traffic rotary and its design.

6. Geotechnical Engineering

- (i) Soil Mechanics: Origin of soils; soil structure and fabric; three-phase system and phase relationships; index properties; identification and classification of soils; permeability- one dimensional flow, Darcy's law; seepage through soils- two – dimensional flow, flownet- its construction and uses; seepage through homogeneous earth dam with and without filters; compaction in laboratory and field conditions; one-dimensional consolidation; time rate of consolidation; shear strength of soils; stress at a point; Mohr's stress circle; soil stabilization.
- (ii) Foundation Engineering: Types of foundation, selection criteria; earth pressure theories- Rankine and Coulomb; stress distribution in soils- Boussinesq's and Westergaard's theories; shallow foundations- Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table, combined footing and raft foundation, contact pressure, settlement of foundation in sand and clay; deep foundations- types of piles, dynamic and static formulae, load capacity of piles in sands and clays, pile load test, negative skin friction.



Controller of Examinations
Assam Public Service Commission,
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