

ASSAM PUBLIC SERVICE COMMISSION
Jawaharnagar, Khanapara, Guwahati-22.

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

S Y L L A B U S
(Degree standard)

Total Marks: 200
Time: 2 (two) hours

Section-A: General Studies
(50 Multiple Choice Objective Type Questions)

Full Marks: 100 Marks

- i) Current Events of National & International importance.
- ii) Indian Polity, Freedom Movement, Constitution of India.
- iii) History of India & History of Assam.
- iv) Geography of India & world.
- v) Indian Economy
- vi) Role of Science and Technology.
- vii) Culture of Assam & India.

Section-B: Civil Engineering
(50 Multiple Choice Objective Type Questions)

Full Marks : 100 Marks

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, leveling and trigonometric leveling 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.

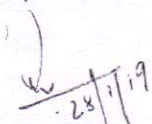
- (ii) Waste Water Engineering: Quantity of sanitary sewage; sewerage systems and their design principles; sewer construction materials; sewer appurtenances; characteristics of domestic sewage; waste water treatment-methods and their sequence, preliminary treatment, primary treatment, secondary treatment; 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.


28/1/19

Principal Controller of Examinations,
Assam public Service Commission,
Jawaharnagar, Khanapara, Guwahati-22.