

Syllabus for *Written Test* for recruitment to the post of **Assistant Engineer (Agri-Irrigation)**
in the West Bengal Services of Agricultural Engineers

1. HYDROLOGY:

Hydrologic cycle: Measurement & analysis of rainfall; Different methods of measuring velocity and discharge; infiltration, factors affecting infiltration; Run-off – factors affecting, measurement and estimation. Hydrograph – components, base flow separation. Unit hydrograph, synthetic unit hydrograph, Occurrence and movement of ground water; Darcy's Law, Co-efficient of permeability, types of wells, hydraulics of wells, determination of aquifer properties, Theis' method, Jacob's method, construction and development of tube wells, testing of tube wells.

2. SOIL AND WATER CONSERVATION:

Modern concepts of soil conservation, causes and effects of soil erosion, erosion control measures. Mechanics of soil erosion, estimation of soil loss, wind erosion and its control, biological control of erosion, stream bank erosion. Design of grassed waterway, graded and contour bunds, terraces. Permanent gully control structures – drop, drop inlet and chute spillways, Principles of watershed management.

3. WATER REQUIREMENTS:

Consumptive use and its estimation, evapotranspiration – estimation and measurement, Duty and Delta of water requirement; Losses and efficiencies in irrigation, field capacity, wilting point and available water.

4. IRRIGATION PRACTICES:

Soil-water-plant relationship. Irrigation water requirements. Irrigation scheduling. Measurement of irrigation water: weirs, flumes, orifices and other methods. Design of field channels. Methods of irrigation: traditional, border, basin and furrow methods of Irrigation. Design of sprinkler and drip irrigation systems. Drainage materials. Design of surface and sub-surface drainage systems. Water logging – causes and remedial measures; Drainage of irrigated lands – surface and sub-surface.

5. SURVEYING AND LEVELING:

Principles and methods of chain surveying, compass surveying, plane table surveying. Care in handling and adjustment of instruments. Levelling, contouring. Calculation of area and volume. Traversing and adjustment of errors.

6. BUILDINGS:

Kinds of building materials – their properties: timber, brick and steel. Design of singly and doubly reinforced concrete beams, R.C.C. columns and slabs. Footings, Roof and Trusses.

7. SOIL MECHANICS:

Index properties of soil-void ratio, porosity, densities, water content, particle size distribution, consistency limits and permeability. Shear strength of soil. Earth pressure and retaining wall.

8. PUMPS:

Water lifting devices, classification of pumps, centrifugal pump and its characteristics, specific speed, NPSH and cavitation, selection of pumps.

9. HYDRAULICS AND FLUID MECHANICS:

Definition and properties of fluids. Units of measurement, kinematics of fluid flow, Bernoulli's equation and Euler's equation of motion. Dimensional analysis and similitude. Laminar and turbulent flow. General equation for head loss in pipes. Flow through pipes; open channel flow, hydraulic jump; Measurement of discharge in pipes and open channels.