

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR SCREENING TEST FOR THE POST OF JUNIOR HYDROGEOLOGIST GROUND WATER DEPARTMENT

1. Occurrence and Distribution of Water-

Origin of water, surface and subsurface distribution of water and residence time concept. Global water cycle. Vertical distribution of subsurface water and concept of groundwater. Groundwater basins and springs.

2. Groundwater and Hydrological Properties of Rocks-

Aquifers and their types; groundwater in igneous, sedimentary and metamorphic rocks, and rock formations. Porosity, Permeability, Specific yield, Specific Retention, Hydraulic conductivity, Transmissivity, Storage co-efficient. Unidirectional and radial, and laminar and turbulent groundwater flow. Darcy's Law and its validity. Application of Darcy's Law in movement of groundwater through homogenous and heterogeneous media. Bernoulli Equation and determination of hydraulic conductivity.

3. Well Water Levels-

Groundwater under confined and unconfined conditions. Water Table and phreatic surface. Significance of Water Table and Water Level in hydrogeology. Water level fluctuations. Water Table contour maps. Concept of barometric and tidal efficiency. Types of water wells and their construction. Well logging methods. Performance of wells; pumping test, slug test, piezometric test. Water level fluctuations, stream flow and groundwater level.

4. Water Quality-

Physical properties of water: turbidity, colour, taste, odour, temperature, specific conductivity. Chemical characteristics of water: Total Dissolved Solids (TDS), pH and Eh, Hardness, Heavy metals and dissolved gases. Hydrochemical classification and graphical representation of hydrochemical data. Microbiological composition of water and impact on human health. Impact of urbanization and climate change on groundwater. Fresh and saline water relationship in coastal areas and impact on aquifer. National and international water quality standards for drinking water and suitability of water for domestic, agricultural and industrial purposes. Fluoride, nitrate, arsenic and heavy metal contamination of water. Methods of water treatment for various uses.

5. Groundwater Exploration and Development-

Surface and subsurface geophysical and geological methods of groundwater exploration. Hydrogeomorphic mapping and application of remote sensing in groundwater exploration. Groundwater basins of India. Application of H-, C-, O- and

Sr-isotopes in hydrogeology. Groundwater exploration drilling and its application. Groundwater development and over-exploitation. Water resource evaluation and National Groundwater Resource Estimation Methodology.

6. Water Resource Management-

Groundwater recharge and problems of draft – recharge imbalance. Watershed management and development of micro-watersheds. National Aquifer Mapping Project, Water conservation awareness programmes, and groundwater regulations and management in India. Concept of artificial recharge and rainwater harvesting practices. Conjunctive use of surface and groundwater. Solid and liquid waste disposal and impact on water quality. Management of groundwater in mining areas.

7. Hydrogeological Scenario of Rajasthan-

Hydrogeological provinces of Rajasthan and potential groundwater zones. Status of groundwater development in Rajasthan and categorization into safe, semi-critical, critical and over-exploited zones. Canal irrigation in Rajasthan and impact on groundwater regime. Water quality deterioration due to industrialization and urbanization in different parts of Rajasthan. Problem of fluorosis in Rajasthan and remedial measures. Conventional practices of water conservation and rainwater harvesting in Rajasthan and their relevance in sustainable development.

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Pattern of Question Papers:

1. Objective Type Paper
2. Maximum Marks : 150
3. Number of Questions : 150
4. Duration of Paper : 2:30 Hours
5. All Questions carry equal marks
6. Medium of Screening Test: Bilingual in English & Hindi
6. There will be **Negative Marking**

(For every wrong answer, one-third of marks prescribed for that particular question will be deducted).

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