भू-विज्ञान परीक्षा 2010
Geologist Examination

Serial No. 2758 D–FDN–K–IZ

HYDROGEOLOGY

Time Allowed : Three Hours *Maximum Marks : 200*

INSTRUCTIONS

*Candidates should attempt **SIX** questions in all including Question No. 1, which is compulsory, from Part—I and attempt **ONE** question each from Sections A, B, C, D and E from Part—II.*

The number of marks carried by each question is indicated at the end of the question.

*Answers must be written only in **ENGLISH**.*

Symbols and abbreviations are as usual.

Neat sketches may be drawn to illustrate answers, wherever required.

Wherever graphs/tables are required to be drawn, these may be plotted on the answer-book itself. No separate graph sheet is required.

PART—I

1. Write notes on any **TEN** of the following in not more than 5 sentences each :— 5×10=50

   (a) Origin of water

(b) Evapotranspiration

(c) Perched aquifer

(d) Reynold's number

(e) Construction of flownets and its importance

(f) Schlumberger electrode arrangement

(g) Groundwater Contour maps

(h) Specific capacity and its determination

(i) Problems of Arsenic in groundwater

(j) Ghyben-Herzberg relation

(k) Hydraulic conductivity

(l) Cable tool method of drilling.

PART—II

SECTION—A

2. Describe the properties of rocks which affect the storage and movement of groundwater. Add a note on Hydrogeology of zones of India. 30

3. Write notes on the following :— 10×3=30

(a) Hydro-stratigraphic Units

(b) Infiltration

(c) Springs.

SECTION—B

4. Derive an equation for steady radial flow for a well in a confined aquifer. Add a note on groundwater modelling. 30

5. Write notes on the following :— 10×3=30

(a) Darcy's Law

(b) Evaluation of aquifer parameter using Theis equation

(c) Development and maintenance of wells.

SECTION—C

6. Discuss the parameters determined in physical analysis of groundwater. Explain the chemical quality criteria for drinking water. Add a note on Sodium adsorption ratio. 30

7. Write notes on the following :— 10×3=30

(a) Piper diagram

(b) Stiff diagram

(c) Circular diagrams.

SECTION—D

8. What are Geophysical techniques ? Describe the Seismic Refraction method and its application in groundwater exploration. Add a note on the importance of magnetic methods in groundwater investigations. 30

9. Write notes on the following :— 10×3=30

(a) Application of Remote Sensing in groundwater exploration

(b) Vertical Electrical Sounding

(c) Different well logging techniques.

SECTION—E

10. Explain the groundwater problems encountered in mining and tunnelling work. Critically comment on the over-exploitation of groundwater resources. Explain the different artificial recharge methods. 30

11. Write notes on the following :— 10×3=30

    (a) Groundwater Legislation

    (b) Roof top rainwater harvesting

    (c) Watershed management.