

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



(Contd.)

- (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



(Contd.)

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.