

Serial No.

C-HFP-L-HMD

## 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.

### PART—I

1. Write notes on the following in not more than 5 sentences each :— 10×5=50
  - (a) Vertical distribution of groundwater
  - (b) Hydrographs
  - (c) Water table fluctuations

- (d) Pumping tests
- (e) Theory of groundwater flow
- (f) Problems of fluoride in groundwater
- (g) Fracture trace analysis
- (h) Location of springs
- (i) WENNER electrode arrangement
- (j) Storage coefficient.

## PART—II

### SECTION—A

2. Explain hydrologic cycle with a suitable diagram. Discuss various governing factors responsible for groundwater movement. 30
3. Write notes on the following :— 6×5=30
- (a) Juvenile and Magmatic waters
  - (b) Classification of aquifers
  - (c) Relation between porosity and permeability
  - (d) Water table contour maps
  - (e) Wet lands.

### SECTION—B

4. Discuss briefly various types of Wells. Enumerate the causative factors of Well failures. Add a note on remedial steps for increasing their life. 30
5. Write notes on the following :— 6×5=30
- (a) Steady state flow through penetrating wells
  - (b) Groundwater flow models

- (c) Purpose of gravel pack
- (d) Theis recovery method
- (e) Flow net characteristics.

### SECTION—C

6. Explain sea water intrusion in the coastal belt and the measures suggested to control it. Add a note on groundwater contamination. 30
7. Write notes on the following :— 6×5=30
- (a) Chemical properties of water
  - (b) Water quality for agricultural purposes
  - (c) Quality of water in sedimentary rocks
  - (d) Necessity of Desalination
  - (e) Significance of radioisotopes in hydrogeologic studies.

### SECTION—D

8. Explain the role of geological structures and intrusives which govern the potential groundwater zones. Add a note on the role of satellite imagery for groundwater exploration. 30
9. Write notes on the following :— 6×5=30
- (a) Collection of hydrogeological data
  - (b) Lineament mapping
  - (c) Radioactivity logging
  - (d) Tracer studies
  - (e) Interpretation of electrical resistivity data.

## SECTION—E

10. Explain the principles involved in groundwater management and conjunctive use of water resources. Add a note on necessity of groundwater legislation.

30

11. Write notes on the following :—

6×5=30

- (a) Problems of over exploitation of groundwater
- (b) Management of renewable groundwater resources
- (c) Groundwater balance
- (d) Problems in groundwater mining
- (e) Recharge well method.