

G-3/321/21

Roll No.....

III Semester Examination, April-2021

M.Sc.

GEOLOGY

Paper I

(Hydrogeology)

Time : 3 Hours]

[Maximum Marks : 80

Note : All questions are compulsory. Question Paper comprises of 3 sections. **Section A** is objective type/Multiple Choice questions with no internal choice. **Section B** is short answer type with internal choice. **Section C** is long answer type with internal choice.

SECTION 'A'

(Objective Type Questions)

Choose the correct answer :

1 × 10 = 10

1. Sandy clay is an example of :
 - (a) Aquifer
 - (b) Aquitard
 - (c) Aquiclude
 - (d) Aquifuge
2. An isotropic aquifer is that in which :
 - (a) The aquifer parameters are independent of direction
 - (b) The aquifer parameters are dependent on direction
 - (c) Both (a) and (b)
 - (d) None of the above
3. A leaky aquifer is that whose :
 - (a) Upper and lower boundaries are aquitards, or one boundary is aquitard and the other is an aquiclude

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- (b) Both boundaries are aquifers
 (c) Both (a) and (b) (d) None of the above
4. The Thiem equation for steady radial flow for confined aquifers can be written as :

$$(a) Kb = \frac{2\pi(S_1 - S_2)}{Q} \ln\left(\frac{r_2}{r_1}\right)$$

$$(b) Kb = \frac{2\pi(S_1 - S_2)}{Q} \ln\left(\frac{r_1}{r_2}\right)$$

$$(c) Kb = \frac{Q(S_1 - S_2)}{\pi} \ln\left(\frac{r_2}{r_1}\right)$$

$$(d) K = \frac{bQ}{2\pi(S_1 - S_2)} \ln\left(\frac{r_1}{r_2}\right)$$

5. The specific capacity of a well is :

- (a) Pumping Rate/Draw down
 (b) Time/Draw down
 (c) Draw down / Pumping rate
 (d) Porosity / Draw down

6. Cooper Jacob method for pumping test with single well utilizes following relationship :

- (a) Time Draw down (b) Distance draw down
 (c) Both (a) and (b) (d) None of the above

7. The distance between successive electrodes is equal in which arrangement of resistivity method :

- (a) Wenner Arrangement

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- (a) Water storage (b) Permeability
 (c) Yield of water (d) Example
2. Explain the following terms with neat labelled diagram :
- (a) Water table (b) Drawdown
 (c) Cone of depression (d) Groundwater divide
 (e) Artesian well

Or

- (a) What do you understand by water table contour map ?
 (b) How do you construct a water table contour map ?
 (c) How can we study the fluctuation of water table using water table contour map ?
3. Write an essay on well development.

Or

Describe any one method of pumping test for determination of aquifer parameters.

4. Describe geophysical methods of groundwater exploration.

Or

Write an essay on groundwater provinces of India.

5. Describe the quality criteria for groundwater use.

Or

Write an essay on various methods of groundwater recharge.

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- (b) Schlumberger arrangement
(c) Both (a) and (b)
(d) None of these
8. The caliper log is a record of :
(a) Well depth (b) Well diameter
(c) Ground water level (d) Zone of saturation
9. Safe yield is the amount of water an aquifer system can yield over as long period without producing :
(a) Unacceptable and undesired effects
(b) Acceptable and desired effect
(c) Both (a) and (b) (d) None of the above
10. 'Water hardness' is used to describe the concentration of in water.
(a) Na and K (b) Ca and Mg
(c) Rb and Sr (d) O and S

SECTION 'B'

4 × 5 = 20

(Short Answer Type Questions)

Note : Answer the following questions in 250 words.

1. Write a note on hydrologic cycle.

Or

Discuss the significance of hydrometeorological data in groundwater geology.

2. Discuss the concept of steady and unsteady flow of groundwater. What is their impact on water table, while pumping of water is done ?

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Or

Write a note on influent and effluent streams with their impact on groundwater level. What are the resultant hydrogeological features. Illustrate your answers with neat labelled diagrams.

3. Discuss the significance of well screen and gravel pack.

Or

Write a note on various types of wells.

4. Write a note on geographical methods of borehole logging.

Or

Discuss the application of remote sensing in groundwater exploration.

5. Discuss the quality parameters of groundwater for domestic use.

Or

Write a note on conjunctive use of surface and groundwater resources.

SECTION 'C'

10 × 5 = 50

(Long Answer Type Questions)

Note : Answer the following questions in 500 words.

1. Describe the following hydrologic properties of rocks :

- (a) Porosity (b) Permeability
(c) Specific Retention (d) Storativity
(e) Transmissivity.

Or

Describe aquifer, aquitard, aquiclude and aquifuge under the following heads :

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