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**Seventh Semester B.E. Degree Examination, Feb./Mar. 2022**  
**Ground Water and Hydraulics**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

**Module-1**

- 1 a. State the advantages and disadvantages of Ground water over Surface water. (06 Marks)
- b. What is an Aquifer? Explain the types of Aquifer, with neat sketches. (06 Marks)
- c. With a neat sketch, explain the vertical distribution of Ground water. (08 Marks)

**OR**

- 2 a. Define Specific Yield, Specific Retention and Porosity. Derive a relationship between them. (06 Marks)
- b. Derive an expression for the storage coefficient of a Confined Aquifer. (06 Marks)
- c. An Aquifer has an average thickness of 60m and an aerial extent of 100 ha. Estimate the available ground water storage if
  - i) The Aquifer is confined and the fluctuation in GWT is observed as 15m.
  - ii) The Aquifer is confined and the Piezometric head is lowered by 50m, which drains half the thickness of the aquifer.Assume a storage coefficient of  $2 \times 10^{-4}$  and a specific yield is 16%. (08 Marks)

**Module-2**

- 3 a. State and explain Darcy's law. Explain the Range of validity of Darcy law. Also discuss its limitations. (06 Marks)
- b. Explain the terms Intrinsic Permeability, Transmissibility. (06 Marks)
- c. What is Permeability? Explain the determination of Permeability by constant head permeameter. (08 Marks)

**OR**

- 4 a. Derive an expression for one dimensional steady flow in homogenous confined and unconfined aquifer. (10 Marks)
- b. During the ground water investigation in the basin, the following data were collected :  
Recharge area identified =  $19 \times 13$  km ; Annual Rainfall = 1070mm  
Infiltration 20% of rainfall (approx) ;  
Transmissibility of the aquifer  $6 \times 10^6$   $\mu$ pd/m (from pump tests in the discharge area)  
Width of the aquifer 21km ;  
Hydraulic gradient (towards the discharge area from observation wells) 1.14 m/km.  
It has to be ascertained whether all the pumpage comes from the recharge area. (10 Marks)

**Module-3**

- 5 a. Explain Cooper – Jacob method to determine aquifer constants S and T for unsteady radial flow towards well. (10 Marks)
- b. A 30cm well penetrates 50m below the static water table. After a long period of pumping at a rate of 1800  $\mu$ pm, the draw downs in the wells at 15 and 45m from the pumped well were 1.7 and 0.8m respectively. Determine the transmissibility of the aquifer. What is the drawdown in the pumped well? (10 Marks)

OR

- 6 a. List out the advantages and disadvantages of open wells and tube wells. (06 Marks)  
b. With a neat sketch, explain the Leaky aquifer and Image Well theory. (06 Marks)  
c. Explain This method to determine formation constants T and S for unsteady radial towards wells. (08 Marks)

**Module-4**

- 7 a. Explain in detail the Seismic Refraction method of Geophysical Investigation. (08 Marks)  
b. Explain i) Radio active logging ii) Fluid logging iii) Electrical logging  
iv) Magnetic meter. (12 Marks)

OR

- 8 a. Explain the Electrical Resistivity method of ground water exploration. (06 Marks)  
b. Write a note on : i) Induction logging ii) Sonic logging. (06 Marks)  
c. Describe various factors that affect the selection of site for wells. (08 Marks)

**Module-5**

- 9 a. What is Artificial Recharge of ground water? Explain various methods of Ground Water Recharge. (06 Marks)  
b. Explain how yield of an open well is determined by Recuperation test. (06 Marks)  
c. List the advantages and disadvantages of Open well and Bore well. (08 Marks)

OR

- 10 a. Briefly describe the design of tube well. (06 Marks)  
b. What is Conjunctive use? Explain its necessity, also explain the techniques involved in it. (06 Marks)  
c. Write a note on Ground Water Runoff. (08 Marks)

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