



Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. Explain the vertical distribution of ground water with a neat sketch. (10 Marks)
b. Define Aquifer with the help of a neat sketch explain the different types of aquifers. (10 Marks)

OR

- 2 a. Write a note on the importance of ground water. (04 Marks)
b. Explain the following with examples :
i) Aquiclude
ii) Aquifuge
iii) Aquitard (06 Marks)
c. Explain briefly occurrence of ground water in different rocks and soils. (10 Marks)

Module-2

- 3 a. Explain storage coefficient with a neat diagram and derive an expression for storage coefficient of an confined aquifer. (12 Marks)
b. An artesian aquifer of 20m thick has a porosity of 20% and bulk modulus of compression 10^8N/m^2 . Estimate the storage coefficient of the aquifer. What fraction of this aquifer is attributable to the expansibility of water? (08 Marks)

OR

- 4 a. State Darcy's law. Discuss the validity limitations and significance. (06 Marks)
b. Explain with a neat sketch the determination of permeability constant head permeameter. (08 Marks)
c. In an area of 100ha the water table dropped by 4.5m of the porosity is 30% and the specific retention is 10%, determine :
i) Specific yield of the aquifer
ii) Change in ground water storage. (06 Marks)

Module-3

- 5 a. Derive an equation for discharge for the case of steady radial flow into an unconfined aquifer. (10 Marks)
b. A tube well of 300mm diameter penetrates fully a confined aquifer. The length of the strainer is 25m. Calculate the yield from the well under a drawdown of 4m. The coefficient of permeability of aquifer = 50 m/day. Assume radius of circle of influence equal to 200m. (10 Marks)

OR

- 6 a. Explain This method to determine aquifer constants S and T for unsteady radial flow towards well. (10 Marks)
- b. A well fully penetrating a confined aquifer was pumped at a uniform rate of 2500 m³/day. During the pumping period the drawdowns were measured in an observation well 60m away. The observed data was plotted and for the matching point the following data was obtained $W(u) = 4.0$ and $u = 1.0 \times 10^{-2}$ $S = 0.72m$ and $r^2/t = 150m^2/min$. Determine the formation constants S and T of the aquifer. (10 Marks)

Module-4

- 7 a. List the various surface and subsurface methods of ground water exploration. (04 Marks)
- b. Describe in detail in exploration of ground water by electrical resistivity method. (12 Marks)
- c. Briefly explain electrical logging. (04 Marks)

OR

- 8 a. Enumerate the ground water exploration by Seismic refraction method. (10 Marks)
- b. Briefly explain :
i) Induction logging
ii) Sonic logging. (10 Marks)

Module-5

- 9 a. Explain brief the advantages and disadvantages of open wells and tube wells. (06 Marks)
- b. What are the factors considered for the selection of pumps for shallow and deep wells? (04 Marks)
- c. Design a tube well for the following data yield required = 0.10m³/s, Radius of circle of influence = 200m, coefficient of permeability = 60m/day, drawdown = 6m, thickness of confined aquifer = 30m. (10 Marks)

OR

- 10 a. With the help of a neat sketch, explain the working of a submersible pump. (10 Marks)
- b. What is the importance of artificial recharge? Explain various methods of ground water recharge. (10 Marks)

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