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21CV645

Sixth Semester B.E. Degree Examination, June/July 2024

Ground Water Hydraulics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With the help of a neat sketch explain the vertical distribution of groundwater. (10 Marks)
- b. Define the terms :
i) Specific yield ii) Specific retention iii) Transmissibility iv) Storage coefficient. (10 Marks)

OR

- 2 a. With the help of neat sketches, explain different types of aquifers. (10 Marks)
- b. In a phreatic aquifer Extending over 1km^2 the water table was initially 25m below ground level sometimes after irrigation with a depth of 20cm of water, the water table rose to a depth of 24m below ground level. Later $3 \times 10^5\text{m}^3$ of water was pumped out and water table dropped to 26.2m below ground level. Determine: i) Specific yield of the aquifer ii) deficit to soil moisture (below field that capacity) before irrigation. (10 Marks)

Module-2

- 3 a. State and explain Darcy's law. Discuss its validity and limitations. (10 Marks)
- b. It was observed in a field test that 3 hour 40 minutes was required for a tracer to travel from one well to another 20m apart, and the difference in their water surface elevations was 0.5m and porosity of the aquifer is 15%. Determine the permeability, seepage velocity and Reynolds's number for the flow, assuming an average grain size of 10mm and kinematic viscosity of water as 0.008 stoke. (10 Marks)

OR

- 4 a. Derive the expressions for average horizontal and vertical permeabilities of stratified soil layers. (12 Marks)
- b. Falling head permeability test is carried out on a soil specimen having cross sectional area of 60cm^2 and height of 15cm. The water level in the stand pipe of diameter 0.5cm. The water level in the standpipe of diameter 0.5cm drops from 100cm to 40cm in 30 minutes. What is the coefficient of permeability of the soil? (08 Marks)

Module-3

- 5 a. Derive an expression for discharge from a well penetrated in a confined aquifer. (10 Marks)
- b. A 30cm well penetrates 50m below the static water table. After a long period of pumping at rate of 1800/pm, the drawdown in the wells at 15m and 45m from the pumped well were 1.70m and 0.8m, respectively. Determine the transmissibility of the aquifer. What is the drawdown in the pumped well? (10 Marks)

OR

- 6 a. Explain Theis method to determine the formation constants of an aquifer. (10 Marks)
- b. Two tube wells, each 20cm diameter are spaced at 100m apart. Both the well penetrates fully a confined aquifer 12m thickness. Calculate the discharge if only one well is discharging under a depression head of 3m. What will be the percentage decrease in discharge of the well if both the well are discharging under a depression head of 3m. Take radius of influence for each well equal to 250m and coefficient of permeability as 60m/day. (10 Marks)

Module-4

- 7 a. With the help of a neat sketch, explain seismic method of refraction for groundwater exploration. (10 Marks)
b. What is conjunctive use? Explain the necessity and advantages. (10 Marks)

OR

- 8 a. With the help of a neat sketch, explain electrical resistivity method of groundwater exploration. (10 Marks)
b. With the help of neat sketch, explain:
i) Strainer type
ii) Cavity type tube wells. (10 Marks)

Module-5

- 9 a. Explain different sources of salinity of Ground water. (10 Marks)
b. Explain R.C Network analog model. (10 Marks)

OR

- 10 a. Explain Chemical analysis of groundwater. (10 Marks)
b. Explain in brief digital computer models. (10 Marks)

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