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17CV742

Seventh Semester B.E. Degree Examination, July/August 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. Explain the vertical distribution of ground water with a neat sketch. (08 Marks)
b. Define the term :
i) Juvenile water
ii) Vadose water
iii) Magmatic water
iv) Connate water. (08 Marks)
c. Write a note on importance of ground water. (04 Marks)

OR

- 2 a. What is an Aquifer? Explain different types of Aquifer with neat sketches. (08 Marks)
b. Define the terms : i) $W_y < V_v$ ii) $S_y = W_y/V$ iii) $S_y = W_y/V$ iv) $D = S_v + S_y$. (08 Marks)
c. Explain the significance of ground water compared to surface water. (04 Marks)

Module-2

- 3 a. Explain Darcy law and discuss the validity and limitations. (08 Marks)
b. Explain storage coefficient with a neat diagram. (08 Marks)
c. Write a note on well interference. (04 Marks)

OR

- 4 a. An Artesian Aquifer 20m thickness has a porosity of 20% and bulk modulus compression 10^8N/m^2 . Estimate the storage coefficient of the Aquifer. What fraction of this attributable to the expansibility of water. (10 Marks)
b. An aquifer has an average thickness of 60m and an aerial extent of 100ha estimate the available ground water storage if
i) The Aquifer is unconfined and the fluctuation in GWT is absorbed in 15M.
ii) The Aquifer is confined and the piezometric surface is lowered by 50m. Which drains half the thickness of the Aquifer. (10 Marks)

Module-3

- 5 a. Describe the steady radial flow in confined Aquifer. (10 Marks)
b. An unconfined Aquifer has a thickness of 30m. A fully penetrating 20cm diameter well in this aquifer is pumped at a rate of 35lit/s. The draw down measured in two observation wells located at distance of 10m and 100m from the well are 75m and 0.5m respectively. Determine the average hydraulic conductivity of the aquifer. At what distance from the well the draw down is significant. (10 Marks)

OR

- 6 a. Write a note on intrinsic permeability. (08 Marks)
b. A 30m well fully penetrates a confined aquifer 30m deep after a long period of pumping at a rate of 1,200lpm the draw down in the well at 20m and 45m from the pumping well are found to be 2.2 and 1.8m respectively. Determine the transmissibility of the aquifer. What is the draw down in the pumped well? (12 Marks)

Module-4

- 7 a. Explain with neat sketch the electrical resistivity (surface method for ground water exploration). (10 Marks)
- b. Briefly explain the electrical logging operations carried out in open hole condition and add a note on normal and lateral resistivity. (10 Marks)

OR

- 8 a. Enumerate the ground water exploration by seismic refraction method. (10 Marks)
- b. Example sonic logging with equation. (05 Marks)
- c. Explain the method of radioactive logging. (05 Marks)

Module-5

- 9 a. Explain different types of wells and also give the method of construction of any one of them. (10 Marks)
- b. With neat sketches, explain the various method of ground water recharge. (10 Marks)

OR

- 10 a. Describe pump for lifting water from wells and also explain the working principle of centrifugal pump. (10 Marks)
- b. What is rain water harvesting? Explain its advantages and disadvantages. (10 Marks)
