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Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Ground Water and Hydraulics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1.
 - a. With a neat sketch, explain the vertical distribution of ground water. (05 Marks)
 - b. Explain the occurrence of ground water in different types of rocks and soils. (05 Marks)
 - c. With the help of neat sketch, explain
 - i) Unconfined aquifer
 - ii) Confined Aquifers
 - iii) Perched Aquifer. (06 Marks)

OR

2.
 - a. Define the terms Aquifers, Aquifuge, Aquitard, Aquiclude. (05 Marks)
 - b. Explain the availability of ground water resources on the earth. (05 Marks)
 - c. In a phreatic aquifer extending over 1km^2 , the water table was initially at 25m below ground level, sometime 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 the water table dropped to 26.2m bgl. Determine :
 - i) Specific yield of the aquifer
 - ii) Deficit in soil moisture (below field capacity) before irrigation. (06 Marks)

Module-2

3.
 - a. State and explain the Darcy's law. Explain its validity and limitations. Also write the assumptions. (08 Marks)
 - b. In an area of 100ha, the water table dropped by 4.5m. If the porosity is 30% and the specific retention is 10%, determine is
 - i) the specific yield of the aquifer
 - ii) change in ground water storage. (08 Marks)

OR

4.
 - a. Define the following :
 - i) Intrinsic permeability
 - ii) Transmissibility
 - iii) Coefficient of permeability (08 Marks)
 - b. An artesian aquifer 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 is attributable of water? (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Derive the discharge equation for steady radial flow into a well in a confined aquifer. (08 Marks)
- b. It is observed in field test that 3hr, 20min was required for the tracer to travel from one well to another 20m apart and the difference in their water surface elevations was 0.5m. Samples of the aquifers between the wells indicated a porosity of 15%. Determine the permeability of the aquifer, seepage velocity and the Reynolds number for the flow assuming an average grain size of 1mm and Kinematic viscosity of water at 27°C is 0.008 stoke. (08 Marks)

OR

- 6 a. Define storage coefficient and derive an expression for storage coefficient of a confined aquifer in terms of compressibility of water and of the aquifer structures. (08 Marks)
- b. Explain Theis method to determine aquifer constants S and T for unsteady radial flow towards well. (08 Marks)

Module-4

- 7 a. Explain the ground water exploration using electrical resistivity method. (08 Marks)
- b. Describe the ground water exploration using seismic retraction method. (08 Marks)

OR

- 8 a. Explain the following :
i) Electric logging
ii) Radioactive logging (08 Marks)
- b. Describe the following :
i) Induction logging
ii) Sonic logging (08 Marks)

Module-5

- 9 a. Explain the types of bore well and its method of construction. (08 Marks)
- b. Explain the parts of the Dug well with neat sketches. (08 Marks)

OR

- 10 a. Write a brief note on Artificial recharge of ground water and its methods. (06 Marks)
- b. What is conjunctive use of water? Explain its necessity. (05 Marks)
- c. What are the pumps are used for lifting water. Write the working principals of any one of the pump. (05 Marks)

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