CBCS SCHEME

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18CV734

Seventh Semester B.E. Degree Examination, Dec.2023/Jan.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. Write a note on importance of ground water. **(04 Marks)**

b. Define the vertical distribution of ground water with neat sketch. **(08 Marks)**

c. Explain in brief the occurrence of ground water in different types of rocks. **(08 Marks)**

OR

2 a. What is an aquifer? Explain :
(i) Aquifuge (ii) Aquitard (iii) Perched aquifer (iv) Specific yield **(10 Marks)**

b. Write a note on Global Water Resources and Indian Water Resources. **(10 Marks)**

Module-2

3 a. Explain Darcy's law with its expression. **(04 Marks)**

b. What is storage coefficient? Explain its characteristics in confined and unconfined aquifers with neat sketches. **(10 Marks)**

c. Define specific yield, specific retention and porosity. Derive a relationship between them. **(06 Marks)**

OR

4 a. What is permeability? Explain the determination of permeability by constant head permeameter. **(10 Marks)**

b. The following data is obtained from the difficult rocky area of solution UP (India):
Area (Rocky) = 1 km^2, Sp. yield of the rock = 2%, normal rain fall = 700 mm, population = 154/km^2, normal fluctuation of water table before and after rains is 3.2 m. Examine how far the drinking water needs of the local population can be meet. **(10 Marks)**

Module-3

5 a. Derive an expression for discharge for the case of steady radial flow into an unconfined aquifer using Dupuit's theory. List the assumptions and limitations. **(10 Marks)**

b. An unconfined aquifer has a thickness of 30 m. A fully penetrating 20 cm diameter well in this aquifer is pumped at a rate of 35 ltrs/s. The drawdown measured in 2 observation wells located at distances of 10 m and 100 m from the well are 7.5 m and 0.5 m respectively. Determine the average hydraulic conductivity of the aquifer. At what distance from the well the drawdown is insignificant? **(10 Marks)**

OR

6 a. Explain Chow's method in un-steady radial flow into a well. **(12 Marks)**

b. A 30 cm well penetrates 50 m below the static water table. After a long period of pumping at a rate of 1800 ℓpm the drawdowns in the wells at 15 and 45 m from the pumped well were 1.7 and 0.8 m respectively. Determine the transmissibility of the aquifer. What is the drawdown in the pumped well? **(08 Marks)**

Module-4

7 a. Explain with a neat sketch, the electrical resistivity (surface) method for ground water exploration. **(10 Marks)**

b. Describe the following:

(i) Induction logging **(05 Marks)**

(ii) Sonic logging **(05 Marks)**

OR

8 a. Explain the ground water exploration using seismic method. **(10 Marks)**

b. Write a short note on the following:

(i) Electrical logging **(05 Marks)**

(ii) Radioactive logging **(05 Marks)**

Module-5

9 a. Explain different types of tube wells with sketches. **(10 Marks)**

b. Describe the different methods for water harvesting recharge structures. **(10 Marks)**

OR

10 a. Describe what are the pumps used for lifting water from wells, also explain the working principle of centrifugal pump. **(10 Marks)**

b. Explain what is conjunctive use of water, also explain its necessity, advantages and disadvantages. **(10 Marks)**

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