



CBCS SCHEME

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15CV742

Seventh Semester B.E. Degree Examination, June/July 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. Define ground water and explain its importance. (08 Marks)
- b. Explain the vertical distribution of sub-surface water with a neat sketch. (08 Marks)

OR

- 2 a. Explain the following geological factors affecting the occurrence of sub-surface water:
i) Porosity ii) Permeability (08 Marks)
- b. Differentiate between confined and unconfined aquifers with a neat sketch. (08 Marks)

Module-2

- 3 a. Define aquifer parameter. Explain specific yield and specific retention. (08 Marks)
- b. Explain storage coefficient and specific storage with the help of a neat sketch. (08 Marks)

OR

- 4 a. Derive Darcy's law and also state the limitations of Darcy's law. (08 Marks)
- b. A field sample of an unconfined aquifer has a median grain size of 0.037cm and a porosity of 0.3. The sample is packed in a test cylinder of length 50cm and diameter 6 cm. The test is conducted using pure water at 20°C, for a period of 3 minutes under a constant head difference of 16.3cm. As a result, 45.2 cm³ of water is collected at the outlet. Determine
i) Hydraulic conductivity of the aquifer sample
ii) Darcy's velocity
iii) Average interstitial velocity. (08 Marks)

Module-3

- 5 a. Derive an expression for radial flow in confined aquifer. (08 Marks)
- b. A well 0.5m in diameter penetrates 33m below the static water table. After a long period of pumping at a rate of 80 m³/hr. The drawdowns in wells 18 and 45m from the pumped well were found to be 1.8 and 1.1m respectively.
(i) What is the transmissivity of the aquifer?
(ii) What is the approximate drawdown in the pumped well?
(iii) Determine the radius of influence of the pumping well. (08 Marks)

OR

- 6 a. Explain leaky aquifer with the help of a neat sketch. (08 Marks)
- b. Explain image well theory with the help of a neat sketch. (08 Marks)

Module-4

- 7 a. Explain Seismic refraction method of ground water exploration. (08 Marks)
- b. Explain Electrical resistivity method of ground water exploration. (08 Marks)

OR

- 8 a. Explain ground water exploration by electrical logging method. (08 Marks)
 b. Describe the radioactive logging method of ground water exploration. (08 Marks)

Module-5

- 9 a. Explain the recharge pit method of artificial ground water recharge. (08 Marks)
 b. Classify types of tube wells based on entry of water method of construction, depth and types of aquifer. Also state the advantages and disadvantages of tube wells and open wells. (08 Marks)

OR

- 10 A well log indicates that a clay layer of thickness 0 – 30m from the ground surface is underlain by a layer of fine sand from 30 – 36m and a layer of coarse sand from 36 – 45m followed by a silt layer at the bottom. If the expected well yield is 9000 lt/min, design all the components of tubewell for both naturally developed and artificially gravel pocked cases, assuming that (a) ground water occurs under confined conditions with a piezometric level of 6m below the ground surface and (b) ground water occurs under unconfined conditions with a water table level of 30.6m below the ground surface. The results of the sieve analysis of the geologic sample obtained from depths 36 – 45m are given in the table below.

IS Sieve size	Weight retained on sieve (gm)
2.80	57.4
2.00	112.2
1.40	84.8
1.00	59.6
0.71	43.2
Bottom pan	41.3
Total	398.5

(16 Marks)
