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B.E., (FULL TIME) DEGREE END SEMESTER EXAMINATION APRIL/MAY - 2011

CIVIL ENGINEERING

VI SEMESTER (REGULATION - 2008)

CE 9033 – GROUNDWATER ENGINEERING

6

Time: 3 hours

Marks: 100

Part – A

10 x 2 = 20

Answer ALL questions

1. Distinguish between Pressure aquifer and water table aquifer.
2. If an artesian aquifer 25m thick has a porosity of 30%, bulk modulus of water is 2.1 GN/m^2 and modulus of elasticity of the soil skeleton is $3 \times 10^8 \text{ N/m}^2$, determine the storage coefficient of an aquifer.
3. Define flow net and how this technique will be helpful for groundwater flow analysis?
4. The drawdown is 3m in an observation well 10 m away from the pumping well (drilled in an artesian aquifer) after 10 min of pumping. What is the time since pumping started, for the same drawdown in another observation well 20 m away from the pumping well?
5. What are the benefits of regional groundwater modeling?
6. Under what circumstances can a radial collector well be most advantageously used?
7. A well screen 1m in length is located 15m below the groundwater table in an unconditioned aquifer having a permeability of 20m/day. The freshwater-seawater interface exists at a depth of 36m below the water table. What is the maximum discharge that can be sustained from the well without causing the salt water to intrude into the well?
8. How will the pH value of this water change if (a) ten drops of a strong acid are added and (b) 5cc of distilled water is added?
9. Define Rain Water Harvesting and state one suitable structure for recharging confined aquifer
10. Why groundwater legislation is necessary for the present scenario?

Part - B

5 x 16 = 80

11. (i) What are meant by the Dupuit assumptions and what use are they in Groundwater Hydrology? (4)

(ii) The water levels on either side of the dam are 8.0 m and 2.0 m above the impermeable base. Calculate (a) the steady state discharge (per meter width) through a vertical side earth dam of length 50 m and permeability $1 \times 10^{-6} \text{ m/s}$. (b) if rain is falling at an assured constant rate of $4.8 \times 10^{-8} \text{ m/s}$, what is the maximum height of the water table in the dam and what distance from the U/S face does this occur? (12)

12. (a) Explain the operation of DC machine in detail, when the machine is operating in both motoring mode as well as generating mode.

(OR)

(b) Explain the working principle of single phase transformer operation in no load and loaded conditions with suitable vector diagrams.

13 (a) Explain, how the rotating magnetic field is developed in a three phase induction motor with neat diagram and waveform.

(OR)

(b) (i) Tabulate the differences between intrinsic and extrinsic semiconductors. (8)

(ii) Explain the VI characteristics of PN junction diodes. (8)

14 (a) (i) Explain the common base configurations of BJT with input and output characteristics. (8)

(ii) Explain the operating principle of DIAC. (8)

(OR)

(b) Write short notes on:

(i) Thermistors (8)

(ii) Piezo electric transducers (8)

15. (a) What are the differences between Amplitude and Frequency modulation techniques? Explain the Amplitude modulation method in detail.

(OR)

(b) (i) Explain the purpose of demodulators in detail. (8)

(ii) Write short notes on Gunn diodes. (8)