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B.E., (FULL TIME) DEGREE ENDSEMESTER EXAMINATIONS, NOV. / DEC. 2012

VI SEMESTER CIVIL ENGINEERING
(REGULATION - 2008)

CE 9033 GROUNDWATER ENGINEERING

Time: 3 hours

Max. Marks: 100

Part – A

10 x 2 = 20 marks

Answer ALL questions

22

1. What are the types of aquifer?
2. Define storage coefficient and specific yield of an aquifer.
3. In what way flow net analysis will be helpful for groundwater flow analysis?
4. What is well loss and safe yield?
5. What are the benefits of regional groundwater modeling?
6. Under what circumstances radial collector well can be most advantageously used?
7. A well is driven in a confined aquifer with known aquifer parameter. Write the equation to estimate S and T.
8. How the pH value of the water change if (a) ten-drops of a strong acid is 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 marks

- 11.(i) Explain with neat sketch why artificial recharge is necessary in the present scenario. (8)
(ii) What is meant by basin management? Explain how it will be helpful for groundwater development. (8)
- 12.a)(i) State Dupuit – Forcheimer assumptions and its uses 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 1×10^{-6} m/s. (b) if rain is falling at an assured constant rate of 4.8×10^{-8} 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)

(OR)

12. (b) (i) The Carbon Isotope dating of the groundwater in an area given 10,000 years at location A and 18,000 years at location B, which is 12 km away from A in the direction of flow of water. The average thickness of the formation is 12 m, running inclined at 6 m / km. Calculate the permeability of the medium. (16)
13. (a) Explain the detailed procedure for Theis graphical method for determining the aquifer parameters S and T and state its limitations. (16)

(OR)

- 13.(b) The following data were collected during the pumping test of a confined aquifer to determine the aquifer parameters. The test well was pumped at the rate of 31.5 lps. The observation well is located at 15.2 m from the main pumping well. Determine T and S of an aquifer by Jacob's technique. (16)

Time (hrs)	0.5	1.0	2.0	4.0	6.0	12.0	24.0	48.0
Drawdown (m)	0.15	0.30	0.46	0.76	0.98	1.31	1.65	1.95

- 14.(a) A circular island of 1000m radius has an effective rainfall of 8mm/day. A central well of 0.4m diameter is pumped at a constant rate of 800lpm. The permeability of the island aquifer is 30m/day. The depth of sea around the island is 12m. Determine drawdown in the well and at the divide. (16)

(OR)

14. (b) (i) Explain briefly about conjunctive use of water? (6)
- (ii) An unconfined aquifer with a specific yield of 0.20 is used as a water supply for the irrigation of farm land. The recharge area of the aquifer is same as the irrigated area. The recharge is limited to 76 mm per year. The saturated thickness of the aquifer is 15.2 m. How many years will the water supply last if 254 mm of water per year is pumped from the aquifer for irrigation? (10)

15. a) Explain the physical, chemical and biological water quality standards for various purposes. Also write the methods to collect the ground water samples in the field (16)

(OR)

- 15.(b) Draw a suitable sketch for various RWH structure and discuss an effective way of implementing Rain Water Harvesting to induce Artificial Recharge. (16)
