Reg. No. : | | | | | | | | | | | |

Q 2101

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Fifth Semester

Civil Engineering

CE 044 — HYDROLOGY

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define hydrology.

2. What is meant by Probable Maximum Precipitation (PMP) over a basin?

3. What is meant by watershed leakage? Under what circumstances watershed leakage is expected?

4. What is the evaporation, if 4.75 liters of water is removed from an evaporation pan of diameter 1.22 m and simultaneous rainfall measurement is 9.9 mm?

5. Distinguish between hyetograph and hydrograph.

6. Why is base flow separated from total runoff?

7. State Darcy's law and its limitations.

8. Distinguish between water table aquifer and pressure aquifer.

9. Define flood.

10. Differentiate between Reservoir routing and Channel routing.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with the help of a neat sketch about the hydrological cycle with its various components. (10)

(ii) The average annual rainfall of 5 rain gauges in a basin is 890, 540, 450, 410 and 550 mm respectively. How many additional gauges are required if it is desired to limit the error to only 10%? (6)

Or

(b) (i) How is precipitation measured? Discuss the three methods which convert the point precipitation to areal precipitation and comment on the best method. (8)

(ii) Describe the working principle of a non-recording type rain gauge with neat sketch, mentioning its advantages and disadvantages. (8)

12. (a) (i) How is the double mass curve technique used to check the consistency and adjust the rainfall record at a suspicious station? (10)

(ii) Explain briefly about the Φ – Index and W–Index. (6)

Or

(b) (i) Explain with neat sketch the method of measuring the velocity at a point in a stream using current meter. (10)

(ii) Write short note on stage discharge relationship. (6)

13. (a) A runoff data at a stream gauge station for a flood are given below in the table : Drainage area is 42 km^2. If the duration of rainfall is 3 hours, derive a 3 hours unit hydrograph for the basin. (16)

Time (hrs.)	0	3	6	9	12	15	18	21
Total Runoff (m^3/s)	50	47	75	120	225	290	270	145
Base flow (m^3/s)	50	47	46	45	45	45	46	48
Time (hrs.)	24	27	30	33	36	39	42	45
Total Runoff (m^3/s)	110	90	80	70	60	55	51	50
Base flow (m^3/s)	50	53	54	57	60	55	51	50

Or

(b) (i) What is a S–curve hydrograph? How it is constructed? What are its uses? (8)

(ii) What do you understand by synthetic unit hydrograph? Explain how it is derived. (8)

14. (a) 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 2500 m^3/day. The observation well is located at 60 m from the main pumping well. Determine T and S of an aquifer by Jacob's technique. (16)

Time (min.)	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
Drawdown (m)	0.20	0.27	0.30	0.34	0.37	0.41	0.45	0.48
Time (min.)	8.0	10.0	12.0	14.0	18.0	24.0	30.0	40.0
Drawdown (m)	0.53	0.57	0.60	0.63	0.67	0.72	0.76	0.81
Time (min.)	50.0	60.0	80.0	100	120.0	150.0	180.0	210.0
Drawdown (m)	0.85	0.90	0.93	0.96	1.00	1.04	1.07	1.10

Or

(b) (i) Explain with neat sketch about the types of aquifer. (12)

(ii) State Dupuit–Forcheimer assumptions and its uses in groundwater hydrology. (4)

15. (a) (i) What are the methods of estimating design flood? What are their limitations? (6)

(ii) Describe the method of estimating a T_r-year flood using Log-Pearson type III distribution. (10)

Or

(b) (i) Derive the Muskingum routing equation and the expression for the routing coefficients C_0, C_1 and C_2. (10)

(ii) Explain how the reservoir characteristics curves are prepared. (6)
