A 182

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Fifth Semester

Civil Engineering

CE 044 — HYDROLOGY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. List the various types of precipitation.

2. Define Isohyet.

3. Write down the Dupuit's assumptions for steady flow.

4. Define rating curve.

5. List the uses of Mass Curve of Rainfall.

6. What are the factors affecting infiltration rate of the soil.

7. Name the instruments used to measure the velocity of water.

8. Define time of concentration a drainage basin.

9. State Darcy's law.

10. Define specific yield.

PART B — ($5 \times 16 = 80$ marks)

11. (i) A catchment of 30 km^2 has one recording gauge. During a storm the mass curve of rainfall was recorded. If the volume of surface runoff measured as 1.2 M m^3.

Time (hr) :	0	2	4	6	8	10	12	14
Cum. Rainfall (mm) :	0	6	17	57	70	81	87	90

Estimate depth of runoff, ϕ index, draw the hyetograph, and total precipitation. (12)

(ii) Compare the non-recording and recording type rain gauges. (4)

12. (a) The max values of one day rainfall, in cm, during each year for a site for a period of 25 years are as follows :

55, 90, 140, 130, 95, 85, 125, 115, 65, 35, 25, 40, 110, 100, 80, 45, 105, 135, 145, 120, 75, 30, 70, 50 and 60.

Compute :

(i) the maximum rainfall values that can occur with the recurrence interval of 15 and 5 years

(ii) 75% dependable rainfall

(iii) Recurrence interval for 93 cm rainfall. (16)

Or

(b) (i) How do you check the adequacy of rain gauge? (6)

(ii) Find out monthly evaporation loss both interms of depth and volume from a canal having base width 30 m and depth of flow 2.5 m. The length of canal is 5 km. The pan initially filled up with water to a depth of 8 cm. During the period of observation a rainfall of 3 cm was recorded. To keep the water level same in the pan, 2 cm depth had to be removed. At the end of period of observation the depth of water in the pan was found to be 8.5 cm, if the pan used is class A. (10)

13. (a) (i) The ordinates of 2 hr UH are as follows :

Time (hr) :	0	2	4	6	8	10	12	14	16	18
UHO (cumec) :	0	12	54	126	112	94	64	36	14	0

Determine the area of catchment, strom hydrograph ordinates, where effective rainfall in 1st 2hr is 2 cm/hr. In 2nd 2 hr is 4 cm/hr, and 3rd 2 hr is 1 cm/hr. Assume base flow as 20 cumecs. Draw the strom hydrograph. (12)

(ii) Briefly explain the hyetograph. (4)

Or

(b) (i) Calculate the discharge by using the current meter reading. For velocity use the following equation. V = 0.51 N + 0.03. Use two point method for velocity computation at 0.2 d and 0.8 d.

Distance (m) :	0	2	4	6	8	10	12	14
Depth (m) :	0	1.3	2.2	2.9	2.1	1.8	1.2	0
Rev. at 0.2 d :	0	40	60	120	98	52	41	0
Rev. at 0.8 d :	0	35	50	100	80	40	30	0
Duration (s) :	0	90	98	140	150	100	90	0

(12)

(ii) Define S curve hydrograph and its uses. (4)

14. (a) (i) A 30 cm diameter well penetrates 25 m below the static water table. After 24 hrs of pumping @ 5,400 liters/minute, the water level in a test well at 90 m is lowered by 0.53 m, and in a well 30 m away the draw down is 1.11 m. Calculate coefficient of permeability of unconfined aquifer, transmissibility of the aquifer, total draw down in the main well. (12)

(ii) Briefly explain various aquifer formations. (4)

Or

(b) (i) At a certain point in a unconfined aquifer of 3 km^2 area the water table was at an elevation of 102 m. Due to natural recharge in a wet season its level raise to 103.2 m. A volume of 1.5 Mm^3 of water was then pumped out of the aquifer caving the water table to reach a level of 101.2 m. Estimate specific yield and volume of recharge during wet season. (8)

(ii) A 30 cm diameter well completely penetrates an artesian aquifer. The thickness of strainer is 25 m. Determine the discharge from the well when the draw down in the well is 4 m and the coefficient of permeability is 45 m/day. Assume radius of influence as 350 m. (8)

15. (a) (i) Route the following flood through a river reach for which the Muskingum coefficients K and x are 22 hr and 0.25 respectively. At time $t = 0$, the outflow discharge is 40 cumec.

Time (hr) :	0	12	24	36	48	60	72
Inflow (cumec) :	40	65	165	250	240	205	170

Calculate the time and attenuation and draw the hydrograph. (12)

(ii) Explain the computation of evaporation by pan method. (4)

Or

(b) (i) For a river, the estimated flood peaks for two return periods by the use of Gumbel's method, are given below :

Return period (years)	Peak flood (cumec)
100	485
50	445

What flood discharge in this river will have a return period of 1,000 years? (8)

(ii) Explain the ISD method of reservoir routing. (8)
