2025

WATER RESOURCE ENGINEERING

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) What are the different methods available for determining mean rainfall over a catchment?   10

   b) Raingauge station X did not function for a part of a month during which a storm occurred. The storm produced rainfall of 84, 70 and 96 mm at three surrounding stations A, B and C respectively. The normal annual rainfalls at the stations X, A, B and C are 770, 882, 736 and 944 mm respectively. Estimate the missing rainfall at station X.   10

2. a) Define inconsistency in rain fall data. How inconsistency in rain fall data can be rectified?   5+5 = 10

   b) Describe the relationships between depth, area and duration for a rainfall over an area of a given duration?   10

3. a) How the stream flow measurement of a river can be done by using area-velocity method?   10

   b) The following table gives the data obtained by a stream-gauging operation. The rating equation of the current meter is $v = 0.51N_s + 0.03$ m/s where N_s = revolutions per second. Calculate the discharge in the stream.   10

Distance from bank (m)	0	1.0	3.0	5.0	7.0	9.0	11.0	12.0
Depth(m)	0	1.1	2.0	2.5	2.0	1.7	1.0	0
Revolutions of a current meter kept at 0.6 m depth	0	39	58	112	90	45	30	0

Duration of observation (s)	0	100	100	150	150	100	100	0

4. a) Discuss various factors affecting the distribution of runoff.   10

    b) What is hydrograph? Explain the different components of a flood hydrograph with the help of a sketch.   2+8=10

5. a) The flood data and base flow in a stream is estimated as shown in the Table below. The catchment area is 600 km^2. Estimate the rainfall excess.   10

Time in days	0	1	2	3	4	5	6	7	8	9
Total discharge (m^3/s)	20	63	151	133	90	63	44	29	20	20
Base flow (m^3/s)	0	41	126	105	62	37	21	80	0	0

    b) What are the assumptions made in the Unit Hydrograph Theory? Describe the various factors affecting the flood hydrograph.   3+7=10

6. a) What are the sources of ground water flow? What is the difference between infiltration and percolation?   2+3=5

    b) Describe briefly how the water table changes in different conditions?   5

    c) Describe the different aquifer properties?   10