



Sixth Semester B.E. Degree Examination, June/July 2025 Hydrology and Irrigation Engineering

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. With engineering representation, explain hydrologic cycle along with processes involved in it. (07 Marks)
- b. Explain how consistency of rainfall data is checked using double mass curve technique. (07 Marks)
- c. The average annual rainfall of 5 raingauge stations in a basin are 89, 68, 54, 45, 41 and 55cm. If the error in the estimation of basin rainfall should not exceed 10%. How many additional raingauge should be installed in the basin? (06 Marks)

OR

2. a. Define Percipitation. List its types and explain with neat sketch how its amount is measured using Symon's rain gauge. (07 Marks)
- b. What is the importance of hydrology? With neat sketch, explain mass curve of rainfall and rainfall hyetograph. (07 Marks)
- c. The average annual rainfall of 8 rain gauge station in a basin are 1000, 950, 900, 850, 800, 700, 600, 400 mm. If the permissible error is 6%. Determine the optimum number of raingauge required in the basin. (06 Marks)

Module-2

3. a. Discuss the factors that affect the evaporation from a water body. (06 Marks)
- b. Describe ISI standard evaporation pan, with a neat sketch. (08 Marks)
- c. The total observed runoff volume during a 6 hour storm with a uniform intensity of 1.5 cm/hour is $21.6 \times 10^6 \text{ m}^3$. If the area of basin is 300 km^2 . Find the average infiltration rate of the basin. (06 Marks)

OR

4. a. Define hydrograph and unit hydrograph and describe the step by step procedure of derivation of a unit hydrograph from an isolated storm. (08 Marks)
- b. Describe how the estimation of evaporation is carried by:
i) Meyer's equation ii) Rohwer's equation. (06 Marks)
- c. The following are the ordinates of 3 hr unit hydrograph. Derive the 6 hr unit hydrograph and plot the same.

Time (hr)	0	3	6	9	12	15	18	21	24
Ordinate of 3 hr unit hydrograph	0	1.5	4.5	8.6	12	9.4	4.6	2.3	0.8

(06 Marks)

Module-3

- 5 a. Define Runoff. Explain the factors affecting runoff. (06 Marks)
 b. Explain with neat sketch, components of storm hydrograph. (06 Marks)
 c. The following ordinates are of 3 hr unit hydrograph. Find out the volume of surface runoff from 1.5 cm effective rainfall of 3 hr duration.

Time (hr)	0	6	12	18	24	30	36	42	48	54	60
Unit Hydrograph ordinates	0	5.1	21.6	27	23.5	17	10.7	6.2	3.2	1	0

(08 Marks)

OR

- 6 a. Explain with a sketch s-curve and its components. (07 Marks)
 b. What are the assumptions, limitations and uses of unit hydrograph theory? (07 Marks)
 c. Given the ordinates of a 4-hr hydrograph as below derive the ordinates of a 12 hr unit hydrograph from the same catchment.

Time (hr)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates of 4 h UH (m ³ /sec)	0	20	80	130	150	130	90	52	27	15	05	0

(06 Marks)

Module-4

- 7 a. Define Irrigation. List and explain benefits and ill effects of irrigation. (07 Marks)
 b. Explain the terms 'Duty', 'Delta' and Base period of a crop and derive an relationship between them. (06 Marks)
 c. A water course as CCA of 2600 hectares out of which the intensities of irrigation for perennial sugarcane and rice crops are 20% and 40% respectively. The duty for these crops at the head of water course are 750 hectares/cumec and 1800 hectares/cumec. Find the discharged required at the head of water course if the peak demand is 20% of the average requirement. (07 Marks)

OR

- 8 a. What is irrigation efficiency? Define different efficiency of irrigation water. (08 Marks)
 b. What are flow irrigation and lift irrigations? Explain types of flow irrigation. (08 Marks)
 c. Write short note on frequency of irrigation. (04 Marks)

Module-5

- 9 a. Write difference between Lacey's theory and Kennedy's theory. (06 Marks)
 b. The slope of channel in alluvial soil is $S = \frac{1}{5000}$. Lacey's silt factor $f = 0.9$. Channel side slope are $\frac{1}{2}H:1V$. Find the channel section and maximum discharge which can be allowed to flow in it. (08 Marks)
 c. What is canal? List its types and explain with neat sketch its classification based on alignment. (06 Marks)

OR

- 10 a. With a neat sketch, explain zones of storage in a reservoir. (08 Marks)
 b. Explain hydrologic investigation of reservoir planning. List the points to be considered for selection of site for a reservoir. (08 Marks)
 c. Define the following:
 i) GCA ii) CCA iii) Time factor iv) Crop factor. (04 Marks)

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