USN | | | | | | | | | | **21CV51**
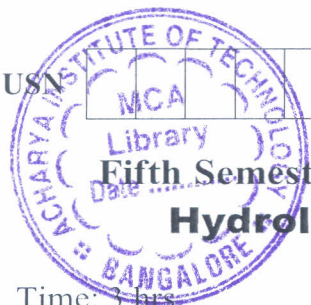
Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Hydrology and Water Resources Engineering

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a.   Discuss the various process involved in hydrologic cycle using Horton's engineering representation.   **(10 Marks)**
    b.   A catchment has six rain gauge stations. In a year, the annual rainfall recorded by the gauges are as follows:

Station	A	B	C	D	E	F
Rainfall (cm)	82.6	102.9	180.3	110.3	98.8	136.7

   i)   Determine the standard error in estimation of mean rainfall in the existing set of rain gauges.
   ii) For 10% error in the estimation of the mean rainfall, calculate the optimum number of rain gauge stations in the catchment.   **(10 Marks)**

OR

2   a.   What is meant by evaporation losses? Discuss the factors affecting evaporation.   **(10 Marks)**
    b.   With neat sketch, illustrate the measurement of infiltration using double ring infiltrometer.   **(10 Marks)**

Module-2

3   a.   What is Runoff? List and explain factors affecting it.   **(10 Marks)**
    b.   Enumerate the rainfall-runoff correlation using linear regression equation.   **(10 Marks)**

OR

4   a.   Define hydrograph. With neat sketch explain the components of hydrograph.   **(10 Marks)**
    b.   The ordinate of a 3 hour unit hydrograph are given below:

Time in hr	0	3	6	9	12	15	18	21	24	27	30
Ordinates (m^3/sec)	0	10	25	20	16	12	9	7	5	3	0

   Find the ordinates of a 6 hour unit hydrograph for a basin. What is the peak value of discharge in this unit hydrograph?   **(10 Marks)**

Module-3

5   a.   Define Irrigation. Discuss in brief the benefits and ill-effects of Irrigation.   **(10 Marks)**
    b.   Illustrate the various method of surface Irrigation.   **(10 Marks)**

OR

6   a.   Derive the relationship between duty, delta and base period.   **(10 Marks)**
    b.   A reservoir with live storage of 400 million cubic meter is available to irrigate an area of 40,000 hectares with 2 fillings each year. The crop season is 125 days. What is the duty?
                                                                                            (10 Marks)

Module-4

7 a. Discuss the factors to be considered while aligning the canal. **(10 Marks)**

b. Area of Irrigation = 3000 hectares
   Area of Rabi crop = 50% of 3000 hectares
   Area of sugar cane = 50% of 3000 hectares
   Duty of Rabi crop = 2000 ha/cumec
   Duty of the sugar cane = 2000 ha/cumec
   Peak demand for rabi crop = 120% of average requirement
   Conveyance loss in canal = 5%
   Design the head discharge of the canal. **(10 Marks)**

OR

8 a. Define reservoir. Explain the types of reservoir based on the purpose. **(10 Marks)**

b. Discuss the procedure to find the capacity of the reservoir using mass in flow curve. **(10 Marks)**

Module-5

9 a. List and explain the causes of floods. **(10 Marks)**

b. Discuss the structural mitigation measures of flood management. **(10 Marks)**

OR

10 a. Define drought. Explain the causes of drought. **(10 Marks)**

b. Explain the following:
   i) Rainwater harvesting technique
   ii) Restoration and Rejuvenation of water bodies. **(10 Marks)**

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