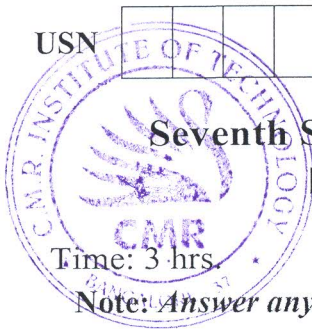


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Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024 Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With a neat sketch, explain the Engineering representation of the Hydrologic cycle. (08 Marks)
- b. Briefly explain with a neat sketch, the i) Moving average curve ii) Mass curve
iii) Rainfall hyetograph iv) Forms of precipitation. (08 Marks)

OR

- 2 a. With a Table, explain Global and Indian water availability. (05 Marks)
- b. Write a note on optimum number of rain gauge stations. (05 Marks)
- c. The average annual rainfall of 8 rain gauge stations in a basin are 1000, 950, 900, 850, 800, 700, 600, 400 mm. If the permissible error is 6%. Determine the optimum number of rain gauges required in the basin. (06 Marks)

Module-2

- 3 a. Explain how evaporation amount is measured using IS class-A pan? List the factors affecting it. (08 Marks)
- b. What is evapotranspiration? Write its measurement using Lysimeter method, with sketch. (05 Marks)
- c. List the factors affecting evapotranspiration. Write Blaney-Criddle equation used to estimate ET. (03 Marks)

OR

- 4 a. Define infiltration. With neat sketch, explain double ring infiltrometer. (06 Marks)
- b. Write a Horton's infiltration equation used to estimate infiltration rate. (02 Marks)

For a storm of 3 hr duration the rainfall rates are as follows:

Time Period (minutes)	30	30	30	30	30	30
Rainfall (cm/hr)	1.4	3.4	4.8	3.2	2.0	1.2

If the surface run off is 3.4 cm determine the ϕ -index and W-index assume initial ϕ -index is more than 1.4 cm/hr. (08 Marks)

Module-3

- 5 a. Define Runoff. Explain the factors affecting Runoff. (05 Marks)
- b. Explain with a neat sketch, components of storm hydrograph. (05 Marks)
- c. Find the ordinates of a flood hydrograph resulting from a storm with rainfalls of 2.50 , 6.85 and 3.75cm each during success –ve 3 hours. The ordinates of a 3 hour UHG are given below. Assume an initial loss of 5mm – infiltration index , $\phi = 2.5$ mm/hr , Base flow = 12 cumec.

Time (hours)	3	6	9	12	15	18	21	24	3	6	9	12	15	18	21	24
UHG ordinates (cumec)	0	115	370	510	395	315	252	231	112	127	96	64	43	25	12	0

(06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain Rainfall – Runoff correlation analysis. (04 Marks)
 b. Define Unit Hydrograph. Explain with a neat sketch, the derivation of unit Hydrograph. State its assumption, application and limitations. (08 Marks)
 c. Given the ordinates of a 4 – h unit hydrograph as below derive the ordinates of a 12 – h unit hydrograph for the same catchment.

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

(04 Marks)

Module-4

- 7 a. Define Irrigation. List and explain benefits and ill effects of irrigation. (08 Marks)
 b. What are Duty, delta and base period? Explain factors affecting Duty of water. (08 Marks)

OR

- 8 a. What is Irrigation efficiency? Define different efficiencies of Irrigation water. (05 Marks)
 b. What are flow Irrigation and Lift Irrigations? Explain types of flow irrigations. (08 Marks)
 c. i) Give relationship between Duty, delta and base period.
 ii) Write a short note on frequency of Irrigation. (03 Marks)

Module-5

- 9 a. Give the classification of canals. Explain salient features of each of them. (08 Marks)
 b. Give the comparison between Lacey's theory and Kennedy's theory. (08 Marks)

OR

- 10 a. Explain with a neat sketch, the various zones of a reservoir (08 Marks)
 b. Design an irrigation canal section to carry 50 cumecs of water at a slope of 0.25 meter per km. Given that $N = 0.0225$ and $m = 1.0$. With usual notations. (08 Marks)
