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Fifth Semester B.E. Degree Examination, May 2017 Hydrology & Irrigation Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Assume any suitable missing data.**

PART – A

- 1
 - a. Explain different types of precipitation. (08 Marks)
 - b. Describe double mass curve technique used to check consistency of rainfall data and adjust rainfall records. (06 Marks)
 - c. A catchment has five raingauge stations. In a year, the annual rainfall recorded by gauges are 78.8 cm, 90.2 cm, 98.6 cm, 102.4 cm and 70.4 cm. For a 6% error in the estimation of the mean rainfall, determine the additional number of raingauges needed. (06 Marks)

- 2
 - a. Explain the terms : (i) Evaporation (ii) Evapotranspiration (iii) ϕ -index (iv) W-index (06 Marks)
 - b. With the help of neat sketches, explain,
 - (i) IMD land pan.
 - (ii) Double ring infiltrometer. (08 Marks)
 - c. A catchment has an area 2.26 km², find the ϕ -index for a given rainfall event according to the table given below:

Time (hr)	0 – 2	2 – 5	5 – 7	7 – 10	10 – 12
Rainfall intensity (mm/hr)	7.1	11.7	5.6	3.6	1.5

 Given the direct runoff volume is $5.6 \times 10^4 \text{ m}^3$. (06 Marks)

- 3
 - a. Define hydrograph. Draw a single peaked hydrograph indicate its various components and explain. (08 Marks)
 - b. What are the propositions and limitations of unit hydrograph? (06 Marks)
 - c. The successive three hourly ordinates of a 6-hr unit hydrograph for a particular basin are 0, 15, 36, 30, 17.5, 8.5, 3, 0 cumec, respectively. The flood peak observed due to 6-hr storm was 150 cumec. Assuming a constant base flow of 6 cumec and an average storm loss of 6 mm/hr, determine the depth of storm rainfall and stream flow at successive three hour interval. (06 Marks)

- 4
 - a. Explain the terms: (i) Standard project flood (ii) Maximum probable flood (iii) Probable maximum precipitation (iv) Design flood. (06 Marks)
 - b. Distinguish between:
 - (i) Channel routing and reservoir routing.
 - (ii) Prism storage and wedge storage. (06 Marks)
 - c. Explain in detail the Muskingum method of flood routing. (08 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.



PART – B

- 5 a. Define the term irrigation. Explain the necessity of irrigation in India. (06 Marks)
- b. Distinguish between : (i) Gravity irrigation and lift irrigation (ii) Direct irrigation and storage irrigation. (06 Marks)
- c. With the help of a neat sketch, explain drip irrigation. Explain its advantages. (08 Marks)

- 6 a. Explain the terms : (i) Hygroscopic water (ii) Capillary water (iii) Field capacity (iv) Wilting point. (08 Marks)
- b. Explain different types of Indian soils. (06 Marks)
- c. After how many days will you supply water to soil in order to ensure efficient irrigations if field capacity of soil = 28%, Permanent wilting point = 15%, Dry density of soil = 15 kN/m³, Effective depth of root zone = 0.75 m, Daily consumptive use of water for the given crop = 10 mm. (06 Marks)

- 7 a. Explain (i) Kharif and rabi crops (ii) Crop period and base period (iii) Duty and Delta (iv) Time factor and capacity factor. (08 Marks)
- b. Explain different methods of assessment of irrigation water. (06 Marks)
- c. Table below gives the necessary data about different crops commanded by a canal taking of

from a storage tank. Taking the time factor for canal to be $\frac{13}{20}$, calculate the discharge required at the head to the canal. If the capacity factor is 0.8, determine the design discharge. (06 Marks)

Crop	Base period (days)	Area (hectares)	Delta at the head of the canal (ha/cumecs)
Sugar cane	320	850	580
Overlap for sugar cane in hot weather	90	120	580
Wheat (Rabi)	120	600	1600
Bajri (Monsoon)	120	500	2000
Vegetable (Hot weather)	120	360	600

- 8 a. Explain different types of canal based on alignment. (08 Marks)
- b. Bringout the differences between Kennedy's and Lacey's theory. (06 Marks)
- c. The slope of a channel in alluvial soil is $\frac{1}{5900}$. Find the channel section and maximum discharge which can be allowed to flow in it. Take Lacey's silt factor $f = 1$. The channel is of trapezoidal section having side slopes $\frac{1}{2}H:1V$ (06 Marks)
