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## Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Explain Hydrology – an Interdisciplinary Science. What are the practical applications of hydrology? (10 Marks)

- b. The analysis of a storm yielded the following :

Isohyet Interval mm	70-80	80-90	90-100	100-110	110-120	120-130
Area (km <sup>2</sup> )	10	85	113	98	136	67

Calculate the average depth of rainfall. (05 Marks)

- c. Explain Double Mass Curve technique to test consistency of data. (05 Marks)

**OR**

- 2 a. With a neat sketch, explain Horton's Qualitative representation of Hydrologic cycle. List the different forms of precipitation. (10 Marks)

- b. The average annual rainfall in cm at 4 existing rain gauge stations in a basin are 105, 79, 70 and 66. If the average depth of rainfall over the basin is to estimated within 10% error, determine the additional number of rain gauges. (05 Marks)

- c. Explain with a neat sketch, Syphon type recording Rain gauge. (05 Marks)

### Module-2

- 3 a. What are the factors affecting Evapotranspiration rates? Explain briefly. (08 Marks)

- b. With a neat sketch, explain ISI standard evaporation pan. Define Pan coefficient. (06 Marks)

- c. The Horton's equation for a basin is given by  $f = 6 + 16e^{-2t}$  where  $f$  is in mm/hr and  $t$  is in hours. If a storm occurs with rainfall intensity more than  $f_0$ , determine the depth of infiltration for first 45min and first 75 minutes. (06 Marks)

**OR**

- 4 a. Explain Methods (any one) for Insitu Infiltration measurement. (08 Marks)

- b. Define Actual Evapotranspiration and Potential Evapotranspiration. The average water spread areas that are likely to be maintained during operation of a reservoir after its completion and the observed monthly pan evapotranspiration rates are given :

Month	Avg. Water Spread area (ha)	Pan Evaporation (cm)
Jan	872	10.2
Feb	797	15.3
March	754	25.4
April	739	30.5
May	726	28
June	717.5	17.8
July	735	15.3
Aug	765	14
Sept	8075	14
Oct	850	15.3
Nov	891	12.7
Dec	917	10.2



Estimate the annual evaporation loss from reservoir in million  $m^3$ . Assume a pan coefficient of 0.7. If 75% of this loss can be prevented and the water thus saved is utilized to irrigate a crop with requirement 57cm of water, how much area can be irrigated. (12 Marks)

**Module-3**

- 5 a. With a neat sketch, explain Base Flow Separation methods and their significance. (10 Marks)  
b. The ordinate of a 4 hr V.H.O at 2 hour interval are 0, 27, 80, 98, 75, 50, 29, 13, 0 cumec. Determine the storm hydrograph which delivers 5cm and 3cm of rainfall in successive 4 hours. Assume  $\phi$  index as 2.5mm/hr and baseflow is constant 10 cumecs. (10 Marks)

**OR**

- 6 a. What are the assumptions and limitation of Unit Hydrograph? (08 Marks)  
b. Construct the S curve using 4 hour unit hydrograph ordinate as 4, 25, 44, 60, 70, 61, 52, 45, 38, 32, 27, 22, 18, 14, 11, 8, 6, 4, 2, 1  $m^3/s$  at 1 hour interval. Hence derive 2 hour unit hydrograph. (12 Marks)

**Module-4**

- 7 a. Define Duty, Delta and Base period and establish a relationship between them. (08 Marks)  
b. Compare Flow irrigation and Lift irrigation. (06 Marks)  
c. Explain the following terms : i) Application efficiency ii) Conveyance efficiency  
iii) Frequency of irrigation. (06 Marks)

**OR**

- 8 a. What are the factors affecting duty? What are the methods to improve duty? (10 Marks)  
b. What are the various components of Drip irrigation? State its suitability in Indian condition. (10 Marks)

**Module-5**

- 9 a. Explain the following terms : i) Gross Command Area ii) Intensity of irrigation  
iii) Time factor iv) Crop factor. (08 Marks)  
b. What are the advantages of Lacey's theory compare to Kennedy's theory? Explain Lacey's theory for design of irrigation canal. (12 Marks)

**OR**

- 10 a. With neat sketch, explain the types of Canal alignment. (08 Marks)  
b. Explain Mass Curve method to determine the storage capacity of Reservoir. (12 Marks)

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