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10CV55

**Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019**  
**Hydrology and Irrigation Engineering**

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**  
**2. Draw neat sketches, wherever necessary.**  
**3. Assume missing data, if any.**

**PART – A**

- 1 a. Define Precipitation. What is Cyclonic precipitation? Distinguish between cold front and warm front. Explain how you would estimate missing precipitation data in detail. (10 Marks)  
 b. There are four rain gauge stations existing in the catchment of a river. The average annual rainfall values at these stations are 800, 620, 400 and 540mm respectively.  
 i) Determine the optimum number of raingauges in the catchment, if it is desired to limit the error in the mean value of rainfall in the catchment to 10%.  
 ii) How many more gauges will then be required to be installed? (10 Marks)
- 2 a. Draw a neat sketch of an automatic recording rain gauge and describe its working. What precautions are to be taken in the installation of the gauge and recording of the rainfall measurements? (10 Marks)  
 b. Explain the double mass curve method of testing the consistency of rain fall record. (05 Marks)  
 c. The analysis of a storm yielded the following information regarding Isohyets. Calculate the average depth of rainfall and volume of rain water for given catchment. (05 Marks)

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

- 3 a. Mention the basic assumptions in the theory of unit hydrograph. Explain step by step method of construction of unit hydrograph from a storm of unit duration. Mention the sources of error in unit hydrograph construction. (10 Marks)  
 b. A reservoir with a surface area of 300 hectares has the following average meteorological data during a given week.  
 Water temperature = 30<sup>0</sup>C ; Relative humidity = 50% ; Wind velocity @ 1m above ground = 12 km/h ; Mean barometer reading = 750 mm of Hg. Estimate the average daily evaporation from the lake reservoir and the volume of water evaporated from the lake during this week. Make use of Meyer's formula and Rohwer's formula to compare the results. Assume  $e_s = 31.82\text{mm of Hg}$ ,  $K_m = 0.36$ . (10 Marks)

- 4 a. Describe step by step procedure adopted for flood routing computations required for reservoirs by 'Trial and Error method'. (10 Marks)  
 b. Describe a double ring infiltrometer for measuring infiltration rate. What is the significance of the outer ring? (05 Marks)  
 c. The average rainfall over a basin of area 107 hectare during a storm was as follows :

Time (hr)	0	1	2	3	4	5	6	7
Rainfall (mm)	0	9	15	24	32	29	19	0

If the volume of run – off from this storm was measured as  $50 \times 10^3 \text{ m}^3$ . Determine the  $\phi$  Index. (05 Marks)

PART – B

- 5 a. Discuss briefly on “ill – effects of irrigation” on environment. (05 Marks)  
b. With a flow diagram, discuss briefly about different systems of irrigation. (10 Marks)  
c. Compare the advantages and disadvantages of well irrigation. (05 Marks)
- 6 a. Discuss briefly about soil classification. (10 Marks)  
b. Describe the factors which affect the duty of water. (10 Marks)
- 7 a. What is meant by “Irrigation efficiencies”? Obtain expressions for various Irrigation efficiencies. (10 Marks)  
b. A water course has a cultivable commanded area of 1200 ha. The intensity of irrigation for crop A is 40% and for B is 35% , both the crops being Rabi crops. Crop A has a Kor period of 20 days and crop B has Kor period of 15 days. Calculate the discharge of the water course, if the Kor depth for crop A is 10 cm and for B it is 16 cm. (10 Marks)
- 8 a. Explain various types of canals, according to various classification systems. (10 Marks)  
b. Design an irrigation channel in alluvial soil according to Lacey’s Silt theory, given the following data :  
Full supply discharge =  $15\text{m}^3/\text{sec}$ .  
Lacey’s silt factor = 1.0.  
Channel side slopes =  $\frac{1}{2} : 1$ . (10 Marks)

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