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10CV55

Fifth Semester B.E. Degree Examination, June/July 2018
Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
 - a. Explain the different methods of determining the average rainfall over a catchment due to storm. Discuss with merits and demerits of the methods. (10 Marks)
 - b. The normal annual rainfall at rain gauge stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1985 the station D was in operative and the stations A, B and C recorded annual precipitation of 91.11, 72.23, 79.89cm respectively. Estimate the rainfall at station 'D' in that year. (05 Marks)
 - c. List out the applications of Hydrology in Engineering. (05 Marks)
- 2
 - a. Discuss the factors that affect the evaporation from a water body. (06 Marks)
 - b. Describe ISI standard evaporation pan, with a neat sketch. (08 Marks)
 - c. The total observed runoff volume during a 6 hour storm with a uniform intensity of 1.5cm/hour is $21.6 \times 10^6 \text{ m}^3$. If the area of the basin is 300 km^2 . Find the average infiltration rate of the basin. (06 Marks)
- 3
 - a. Define Hydrograph and Unit Hydrograph and describe the step by step procedure of the derivation of a unit hydrograph from an isolated storm. (10 Marks)
 - b. Given the ordinates of a 4-h unit hydrograph as below derive the ordinates of a 12-h unit Hydrograph for the catchment. (10 Marks)

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
UHG -4h	0	20	80	130	150	130	90	52	27	15	5	0

- 4
 - a. What are the methods of estimating design flood? What are their limitations? (08 Marks)
 - b. Define Flood Routing. What are the uses of flood routing? (06 Marks)
 - c. A culvert is proposed across a stream drainage an area of 185 hectares. The catchment as a slope of 0.004 and the length of travel for water is 1150m, estimate the 25 year flood of the rainfall is given by

$$I = \frac{1000T_r^{0.2}}{(t + 20)^{0.7}}$$

Where I is in mm/hour, T_r is in years and 't' is in minutes. Assume runoff co-efficient of 0.35. (06 Marks)

PART - B

- 5
 - a. What is the necessity of Irrigation? Discuss in brief the merits and demerits of Irrigation. (10 Marks)
 - b. Compare Surface and Subsurface irrigation. (05 Marks)
 - c. Write a note on Border strip method of irrigation, with neat sketch. (05 Marks)
- 6
 - a. Write a note on the following : i) Saturation capacity ii) Field capacity iii) Wilting point iv) Ready available moisture v) Frequency of irrigation. (10 Marks)



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- b. A loam soil has field capacity of 22% and wilting co-efficient of 10%. The dry unit weight of soil is 1.5 gm/cc. If the root zone depth is 70 cm, determine the storage capacity of the soil. Irrigation water is applied when moisture content falls to 14%. If the water application efficiency is 75%, determine the water depth required to be applied in the field. (10 Marks)
- 7 a. Explain the terms 'Duty', 'Delta' and Base period of a crop and derive an relationship between them. (06 Marks)
b. What are the methods of assessment of irrigation water and why it is essential? (06 Marks)
c. A water course as C.C.A of 2600 hectares out of which the intensities of irrigation for perennial sugarcane and rice crops are 20% and 40% respectively. The duty for these crops at the head of water course are 750 hectares/cumec and 1800 hectares/cumec. Find the discharge required at the head of water course if the peak demand is 20% of the average requirement. (08 Marks)
- 8 a. Define Canal and explain various types of canals classified. (10 Marks)
b. Explain how would you design the channel using Kennedy's theory for a channel of given discharge (Q), Rugosity(N), CVR (m) and bed width – depth ratio (B/D). (10 Marks)
