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10CV55

Fifth Semester B.E. Degree Examination, July/August 2021
Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Missing data may be suitably assumed.

- 1
 - a. Define hydrology. Explain with neat sketch, qualitative representation of Horton's hydrological cycle. **(08 Marks)**
 - b. With neat sketch, explain Symon's rain gauge for the measurement of rain fall. **(06 Marks)**
 - c. There are four rain gauge stations existing in the catchment of river. The average annual rainfall values at these station are 800, 620, 400 and 540mm respectively.
 - i) Determine the optimum number of rain gauges in the catchment, if it is desired to limit the error in the mean value of rain fall in the catchment to 10%.
 - ii) How many more gauges will then be required to be installed. **(06 Marks)**
- 2
 - a. Define Evaporation. List and briefly explain factors that affect evaporation. **(06 Marks)**
 - b. What is Infiltration? Explain with sketch the measurement of Infiltration by double ring Infiltrimeter. **(08 Marks)**
 - c. A 6hr storm produced rain fall Intensities of 7, 18, 25, 12, 10 and 3mm/hr in successive one hour Intervals over a basin of 800sq.km. The resulting runoff is observed to be 2640 hectare-meters. Determine ϕ -Index for the basin. **(06 Marks)**
- 3
 - a. Define hydrograph. Explain the various components of a simple hydrograph resulted from a storm rainfall. **(06 Marks)**
 - b. What do you mean by unit hydrograph? List the assumptions made in deriving the unit hydrograph. **(06 Marks)**
 - c. The ordinates of a 3 hour unit hydrograph are given below:

Time in hr	0	3	6	9	12	15	18	21	24	27	30
Ordinates m^3/sec	0	10	25	20	16	12	9	7	5	3	0

Find the ordinates of 6 hour unit hydrograph for the same basin, analytically. Also sketch this unit hydrograph. What is the peak value of discharge in this unit hydrograph? **(08 Marks)**

- 4
 - a. Define flood. Explain the empirical methods of estimation of peak flood for catchments. **(08 Marks)**
 - b. What is the importance of design flood? List the factors affecting flood. **(06 Marks)**
 - c. Define flood routing. Differentiate between channel routing and reservoir routing. **(06 Marks)**
- 5
 - a. Define Irrigation. What are the benefits and ill effects of Irrigation? **(06 Marks)**
 - b. Outline the methods of Irrigation and explain sprinkler Irrigation. **(06 Marks)**
 - c. Illustrate with neat sketches, Bandhara Irrigation. List its advantages and disadvantages. **(08 Marks)**

- 6 a. Explain in brief, classification of Indian soils. **(06 Marks)**
 b. Name and explain the soil moisture presence in different zones, with neat sketch. **(08 Marks)**
 c. Estimate the watering interval in days with the following data pertains to healthy growth of crop.
 i) Field capacity = 30%
 ii) Permanent wilting percentage = 11%
 iii) Density of water = 1000g/m^3
 iv) Density of soil = 1300kg/m^3
 v) Effective depth of soil = 700mm
 vi) Daily consumptive use of water for given crop = 12mm
 For healthy growth moisture content must not fall below 25% of the water holding capacity between the field capacity and permanent wilting point. **(06 Marks)**

- 7 a. Define duty and delta and obtain the relationship between them. **(06 Marks)**
 b. Define with suitable equations various Irrigation efficiencies used in the Irrigation system. **(06 Marks)**
 c. The base period, intensity of irrigation and duty of the water for various crops under canal system are given in table below. Determine reservoir capacity if the culturable commanded area is 4000 hectares. Canal losses are 20% and reservoir loss are 10%.

Sl. No.	Crop	Base period (days)	Duty of water at the field (ha/cumec)	Intensity of Irrigation in %
1	Wheat	120	1800	20
2	Sugarcane	360	1700	20
3	Cotton	180	1400	10
4	Rice	120	800	15
5	Vegetables	120	700	15

(08 Marks)

- 8 a. Explain briefly the classification of canals based on alignment. **(06 Marks)**
 b. Explain briefly:
 i) Critical velocity
 ii) Critical velocity ratio
 iii) Regime channel. **(06 Marks)**
 c. What is meant by design of canals and a comparison between Kenned's and Lacey's theory? **(08 Marks)**
