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Sixth Semester B.E. Degree Examination, July/August 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. Discuss the various processes involved in 'Hydrologic Cycle' using Horton's Engineering representation. (10 Marks)
b. List the importance of hydrology with emphasis on global water availability. (10 Marks)

OR

- 2 a. Define Rain gauge. Describe with a neat sketch, the principle of working of Symon's non-recording gauge and its demerits. (06 Marks)
b. What is Precipitation? Distinguish between Convection and Orographic precipitation. (07 Marks)
c. Determine the optimum number of raingauges in a catchment area using the following data :
i) Number of existing rain gauges = 08.
ii) Mean annual rainfall at the gauges : 1000, 950, 900, 850, 800, 700, 600 and 400mm.
iii) Permissible error = 6%. (07 Marks)

Module-2

- 3 a. What is meant by 'Evaporation Losses'? Discuss the factors affecting evaporation. (08 Marks)
b. Define 'Evapotranspiration'. Explain in brief the 'Lysimeter method' of estimating the same in the field. (06 Marks)
c. What is the Evaporation, if 4.80 litres of water is removed from an evaporation pan of diameter 1.22m and the simultaneous rainfall measurement is 9.0mm? (06 Marks)

OR

- 4 a. Discuss the factors that affect infiltration. Explain with a neat sketch, measurement of infiltration using double ring infiltrometer. (10 Marks)
b. A 6 hour storm produced rainfall intensities of 7, 18, 25, 12, 10 and 3mm/hour in successive one hour intervals over a basin of 800km². The resulting run-off is observed to be 264 × 10⁵ m³. Determine ϕ - index for the basin. (10 Marks)

Module-3

- 5 a. Define the following :
i) Basin recharge ii) Direct run off iii) Drainage density iv) Form factor
v) Overland flow. (10 Marks)
b. What is Runoff? List and explain factors affecting it. (10 Marks)

OR

- 6 a. How the hydrograph is affected by the following :
i) Shape of the basin ii) Non-uniform aerial distribution of rainfall. (06 Marks)
b. Define 'Unit hydrograph'. With the help of neat sketch, explain the various components of a flood hydrograph. (06 Marks)

- c. Given the ordinates of a 4 – hour unit hydrograph. Derive the ordinates of 12 – hour unit hydrograph for the same catchment. What is the peak value of discharge and the corresponding time interval observed in 4-h and 12-h unit hydrograph. (08 Marks)

Time (Hours)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates of 4-h UH cm^3/sec	0	20	80	130	150	130	90	52	27	15	05	0

Module-4

- 7 a. Define Irrigation. Discuss in brief the benefits and ill – effects of irrigation. (08 Marks)
 b. Distinguish between : Direct Irrigation and Storage Irrigation. (06 Marks)
 c. What is Bhandara Irrigation? List its advantages and disadvantages. (06 Marks)

OR

- 8 a. Define Duty and Delta. Derive the relation between them. (06 Marks)
 b. Define the following :
 i) Permanent wilting point ii) Field capacity. (06 Marks)
 c. After how many days water supply is required to ensure good yield, if :
 Field capacity of soil = 30% ; Permanent wilting point = 12% ;
 Density of soil = 1.4g/cc ; Effective depth of root zone = 80cm ;
 Daily consumptive use = 15mm. Readily available moisture is 85% of available moisture. (08 Marks)

Module-5

- 9 a. Write an explanatory note on Canal classification on the basis of its alignment. (06 Marks)
 b. Enumerate the basic differences between Lacey's and Kennedy's theory. (06 Marks)
 c. A channel section is to be designed for the following data :
 Discharge $Q = 5 \text{ cumecs}$; Silt factor = 1.0 ; Side slope = $0.5H = 1V$.
 Also determine bed slope of the channel. Use Lacey's theory. (08 Marks)

OR

- 10 a. With a neat sketch, explain different zones of a storage reservoir. (10 Marks)
 b. With a neat sketch, explain step – by – step procedure of determining reservoir capacity for a specific yield using the mass – inflow curve. (10 Marks)
