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10CV55

Fifth Semester B.E. Degree Examination, July/August 2022

Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 100

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

PART – A

- 1 a. Describe the working of a float type raingauge with a neat sketch. Discuss its advantages and disadvantages. **(08 Marks)**
 b. Explain the use of double mass technique for checking consistency of rainfall record. **(06 Marks)**
 c. A storm commenced at 6.00 Hrs. The ordinates of the rainfall mass curve of this storm in mm as recorded by a recording raingauge at 15 minutes intervals are 0, 9.5, 17.0, 27.0, 40.5, 49.0, 63.0, 84.0, 95.0, 102.0, 110.0, 112.0 and 112.0. Construct the hystograph of this storm for a uniform interval if 15 minutes. **(06 Marks)**
- 2 a. Discuss various methods of reducing evaporation from water body. **(08 Marks)**
 b. Discuss the various factors affecting evapotranspiration. **(06 Marks)**
 c. The rate of rain fall for the successive 30 min period of a 3 hour storm are 17, 35, 51, 27, 23 and 9 mm/hr. The corresponding surface runoff is estimated to be 36 mm/hr. Establish the ϕ -index. Also determine the W-index. **(06 Marks)**
- 3 a. What is master depletion curve? How it is used to separate the base flow from total runoff? **(06 Marks)**
 b. Define unit hydrograph. What are the assumptions made for deriving unit hydrograph? **(06 Marks)**
 c. The runoff data of a stream gauging station for a flood are given below. The drainage area is 40 km². The duration of the rainfall is 3 hours. Derive the 3 hour unit hydrograph for the basin.

Date	1 – 8 – 90								2 – 8 – 90							
Time (hr)	2	5	8	11	14	17	20	23	2	5	8	11	14	17	20	23
Q (m ³ /s)	50	47	75	120	225	290	270	145	110	90	80	70	60	55	51	50

- 4 a. Explain the method of design flood estimation using the rational method. **(06 Marks)**
 b. Explain the following: **(06 Marks)**
 (i) Maximum probable flood
 (ii) Standard project flood
 (iii) Design flood
 c. Explain the method of determining the Muskingum parameters k and x of a reach of a pair of observed inflow and outflow hydrograph. **(08 Marks)**

PART – B

- 5 a. Discuss briefly the benefits and ill effects of irrigation. **(08 Marks)**
 b. Distinguish between inundation irrigation system and perennial irrigation system. **(06 Marks)**
 c. Write short notes on sewage irrigation. **(06 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



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- 6 a. What are the functions of irrigation soils? (06 Marks)
b. Write short note on Depth and Frequency of irrigation. (06 Marks)
c. A stream of 150 LPS was delivered from a canal and 11 LPS were delivered to the field. An area of 2.2 hectares was irrigated in 8 hours. The effective depth of root zone was 1.5 m. The runoff loss in the field was 445 m^3 . The depth of water penetration varied linearly from 1.5 m at the head end of the field to 1.1 m at the tail end. The available moisture holding capacity of the soil is 200 mm per meter depth of soil. Determine the water conveyance efficiency, water application efficiency and water storage efficiency. Irrigation was started at a moisture extraction level of 50%. (08 Marks)
- 7 a. Define consumptive use of water? On what factors consumptive use depends? Explain them in brief. (06 Marks)
b. Discuss any four methods of assessment of irrigation water. (06 Marks)
c. A water course commands an irrigated area of 1000 hectares. The intensity of irrigation of rice crop is 70%. The transplantation of rice crop takes 15 days and during this period, the total depth of water required is 500 mm. The useful rain falling during transportation of rice crop in the field is 120 mm. Find the duty of irrigation water of the crop on the field during transplantation, at the head of the field and also at the head of the water course assuming loss of water to be 20% in the water course. Also calculate discharge required in the water course. (08 Marks)
- 8 a. Explain in brief:
(i) Branch canal
(ii) Feeder canal
(iii) Watershed canal
(iv) Productive canal (06 Marks)
b. Describe briefly the various considerations made in the alignment of an irrigation canal. (06 Marks)
c. Design an irrigation canal to carry a discharge of $5 \text{ m}^3/\text{s}$. Assume $N = 0.0225$, $m = 1.0$ and $\frac{B}{D}$ ratio as 3.24. (08 Marks)

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