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17CV73

Seventh 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 importance of Hydrology. **(06 Marks)**
   b. With a neat sketch, explain the engineering representation of the Hydrologic Cycle. **(08 Marks)**
   c. Average annual rainfall of four existing rain gauge stations in a basin are 105mm, 79mm, 70mm and 66mm. If the average depth of rainfall over the basin is limited within 10% error, determine the additional number of gauges required. **(06 Marks)**

OR

2 a. Explain different types of precipitation. **(08 Marks)**
   b. Explain with neat sketch, measurement of rainfall using Syphon type rain gauge. **(06 Marks)**
   c. A precipitation station X was inoperative for some time during which a storm occurred. At three stations A, B and C surrounding station X, the total precipitation recorded during this storm are 84mm, 70mm and 96mm respectively. The normal annual precipitation amounts at X, A, B and C are respectively 770mm, 882mm, 736mm and 944mm. Estimate the storm precipitation at X. **(06 Marks)**

Module-2

3 a. Explain how evaporation amount is measured using IS class – A pan? List the factors affecting it. **(08 Marks)**
   b. What is Evapotranspiration? Write its measurement using Lysimeter method. **(04 Marks)**
   c. The total observed runoff volume during 6hr storm with uniform intensity is 1.5cm/hr is 21.6×10^6 m^3. If the area of basin is 300 km^2, find the average rate of Infiltration for the basin. **(08 Marks)**

OR

4 a. Describe the method of determining infiltration capacity using a double ring in-filtrometer, with neat sketch. **(06 Marks)**
   b. Write Blaney – Criddle equation used to estimate Evapo – transpiration and list the factors affecting Evapo – transpiration. **(08 Marks)**
   c. The following are the rates of rainfall for successive 20 minutes period of a 140 minutes storm 2.5, 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr. Taking the value of ϕ index as 3.2 cm/hr, find out the net runoff in cm, the total rainfall and the value of W - Index. **(06 Marks)**

Module-3

5 a. What is Runoff? Explain the factors affecting Runoff. **(10 Marks)**
   b. The ordinates of a storm hydrograph due to 6h isolated storm is given. Obtain the ordinates of 6h unit hydrograph for the catchment, if its area is 423 km^2.

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
Discharge (m^3/s)	10	32	88	116	102	85	71	59	47	39	32	26	22	18	15	10

(10 Marks)

OR

6 a. Explain with a neat sketch, components of Hydrograph. **(05 Marks)**
   b. What are the assumptions made in Unit Hydrograph theory? **(05 Marks)**
   c. Find the ordinates of a flood hydrograph resulting from a storm with rainfalls of 2.50 , 6.85 and 3.75cm each during successive 3 hours. The ordinates of 3 hour UHG are given below :
Assume an initial loss 5mm , Infiltration index ϕ = 2.5mm/hr , Base flow = 12 cumec.

Time (hours)	3	6	9	12	15	18	21	24	3	6	9
UHG Ordinates (Cumec)	0	115	370	510	395	315	252	231	172	127	96

12	15	18	21	24
64	43	25	12	0

(10 Marks)

Module-4

7 a. Define Irrigation. List the benefits and ill effects of Irrigation. **(10 Marks)**
   b. With a neat sketch, explain Bandhara Irrigation. List its advantages and disadvantages. **(10 Marks)**

OR

8 a. Define Duty and Delta. What are the factors affecting duty of water? Explain. **(10 Marks)**
   b. Table gives the necessary data about the crop, their duty and area under each crop , commanded by a canal taking off from a storage tank. Taking time factor for the canal 13/20, calculate the discharge required at the head to the canal. If the capacity factor is 0.8, determine the design discharge.

Crop	Base Period (days)	Area (ha)	Duty (ha/cumec)
Sugarcane	320	850	580
Overlap for sugarcane in summer	90	120	580
Wheat (Rabi)	120	600	1600
Bajri (Monsoon)	120	500	2000
Veg (Hot weather)	120	360	600

(10 Marks)

Module-5

9 a. What is Canal? List its types and explain the classifications based on capacity. **(10 Marks)**
   b. Design the canal for the discharge of 30 cumec with silt factor 1.0. Side slope – 0.5 H : IV.
(10 Marks)

OR

10 a. Explain different storage zones of reservoir with neat sketch. **(10 Marks)**
   b. Explain the investigations of Reservoir planning. List the points to be considered for selection of site for a reservoir **(10 Marks)**

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