CBCS SCHEME

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21CV51

Fifth Semester B.E. Degree Examination, June/July 2024
Hydrology and Water Resources Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain Horton's hydrological cycle with sketch. **(08 Marks)**

b. Discuss the methods of computation of average rainfall over a basin. **(06 Marks)**

c. A catchment has five rain gauge stations. In a year the annual rainfall recorded by the gauges are 78.8cm, 90.2cm, 98.6cm, 102.4cm and 70.4cm for a 6% error in the estimation of the mean rainfall, determine the additional number of rain gauges needed. **(06 Marks)**

OR

2 a. With a neat sketch explain Indian standard evaporation pan. **(06 Marks)**

b. Explain infiltration capacity curve with sketch. **(06 Marks)**

c. The annual rainfall at station x and the average of annual rainfall at 10 surrounding base stations in cm are given below for a period of 16 years starting from 1979.

Year	1970	1971	1972	1973	1974	1975	1976	1977
Rainfall @x (cm)	95	75	90	85	95	90	100	90
10 station average (cm)	75	55	70	65	75	70	70	70
Year	1978	1979	1980	1981	1982	1983	1984	1985
Rainfall @x (cm)	75	65	70	87	67	62	55	69
10 station average (cm)	75	65	90	86	68	67	62	77

(08 Marks)

Module-2

3 a. Discuss the runoff and explain the factors affecting runoff. **(06 Marks)**

b. With a neat sketch explain the components of a single peaked hydrograph. **(06 Marks)**

c. The rate of rainfall for successive 30 min periods of a 4 hour storm are given below : 3.5, 6.5, 8.5, 7.8, 6.4, 4.0, 4.0, 6.0 cm/hr. Take a value of ϕ - index as 4.5cm/hr compute the following :
i) total rainfall ii) total rainfall excess iii) Wi. **(08 Marks)**

OR

4 a. Define unit hydrograph, and construction of UH. **(06 Marks)**

b. Describe the methods separation of base flow and direct runoff in a single peaked storm hydrograph. **(06 Marks)**

c. Find the ordinates of storm hydrograph resulting from a 3 hr storm with rainfall of 2, 6.75 and 3.75cm during subsequent 3 hr intervals. The ordinates of 3 hr hydrograph are given below :

Hours	03	06	09	12	15	18	21	24	03	06	09	12	15	18	21	24
UGO cumes	0	110	365	501	390	310	250	235	175	130	95	69	40	22	10	0

(08 Marks)

Module-3

5 a. Explain the irrigation methods with sketches. **(06 Marks)**

b. Explain drip irrigation with sketches. **(06 Marks)**

c. A loam soil has field capacity of 22% and wilting coefficient of 10%. The dry unit weight of soil is 15kN/m^3. If the root zone depth is 70cm, 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. **(08 Marks)**

OR

6 a. Explain irrigation efficiencies with equations. **(06 Marks)**

b. Define duty, delta and derive the relation between them. **(06 Marks)**

c. The base period intensity of irrigation and duty of various crops under a canal system are given in the table below. Find the reservoir capacity of the canal losses are 20% and reservoir losses are 12%.

Crop	Base period days	Duty at the field hr/cume	Area under the crop(hect)
Wheat	120	1800	4800
Sugar cane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetable	120	200	1400

(08 Marks)

Module-4

7 a. What are the types of canals explain with sketches. **(08 Marks)**

b. Explain Kennedy's method of canal design. **(06 Marks)**

c. Explain zones of storage in reservoir with sketch. **(06 Marks)**

OR

8 a. How the reservoir capacity is calculated for a specified yield form the mass inflow curve. **(08 Marks)**

b. Discuss the factors affecting the site for selection of a reservoir. **(06 Marks)**

c. The construction cost for certain possible height of a dam at a given site have been estimated and are tabulated. The storage capacity for all these dam heights are also given. Determine the most economic height of the dam.

Height of dam in (mt)	10	20	30	40	50	60	70
Construction cost (million Rs)	4	8	12	18	27	39	50
Storage in (mcm)	50	110	180	250	350	500	600

(06 Marks)

Module-5

9 a. Define marginal bund and design steps for marginal bunds. **(08 Marks)**

b. What are the causes of flood? Explain any five. **(06 Marks)**

c. Discuss the measures for water conservations and augmentation. **(06 Marks)**

OR

10 a. Explain rain water harvesting methods. **(08 Marks)**

b. How the restoration and rejuvenation of old tanks and carried out. **(06 Marks)**

c. What are drought management schemes in India? **(06 Marks)**

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