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10CV55

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**
2. Assume any suitable missing data.

PART – A

- 1 a. Explain different types of precipitation. (08 Marks)
 b. Analysis of a storm yielded the following information regarding isohyets. Calculate average depth of rainfall. (06 Marks)

Isohyetal interval (mm)	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130
Area (km ²)	20	96	125	80	100	89

- c. The average annual rainfall at five existing rain gauge stations in a watershed are 1000mm, 995mm, 800mm, 825mm and 750mm. If the average depth of rainfall should be estimated within 6% error, determine the optimal number of rain gauges for the water shed. (06 Marks)
- 2 a. Differentiate between : i) Evaporation and Evapotranspiration ii) W – index and ϕ - index iii) AET and PET iv) Infiltrometer and Lysimeter. (08 Marks)
 b. What are the measures taken to reduce the evaporation? (06 Marks)
 c. A twelve hour storm rainfall with the following depths in cm occurred over a basin : 2, 2.5, 7.6, 3.8, 10.6, 5, 7, 10, 6.4, 3.8, 1.4 and 1.4. The surface runoff resulting from the above storm is equivalent to 25.5cm of depth over the basin. Estimate the average infiltration index. (06 Marks)

- 3 a. Define Flood hydrograph and explain the different components of flood hydrograph. (06 Marks)
 b. What is a Master depletion curve? What is its use? (04 Marks)
 c. 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 423km². (10 Marks)

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

- 4 a. Define Flood. List the factors influencing flood. (05 Marks)
 b. Explain the rational formula of estimation of flood. (05 Marks)
 c. The values for K and x for a river reach were found to be 12h and 0.2 respectively. Route the following flood through the reach. Inflow values at 6h interval are (in m³/s) : 10, 20, 50, 60, 55, 45, 35, 27, 20, 15 and 13. (10 Marks)

PART – B

- 5 a. Define Irrigation. What is the necessity for irrigation? (06 Marks)
 b. Explain briefly : i) Systems of Irrigation ii) Environmental impacts of irrigation. (14 Marks)

- 6 a. Give the classification of Indian soils. (06 Marks)
 b. Define Irrigation efficiencies. (06 Marks)
 c. What are the different methods of maintaining soil fertility? (08 Marks)

- 7 a. Define Duty. 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. (10 Marks)

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

- 8 a. What are the consideration for alignment of canals? (10 Marks)
 b. Design the canal for the discharge of 30 cumec with silt factor 1.0. Side slope – 0.5H : 1V. (10 Marks)
