U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

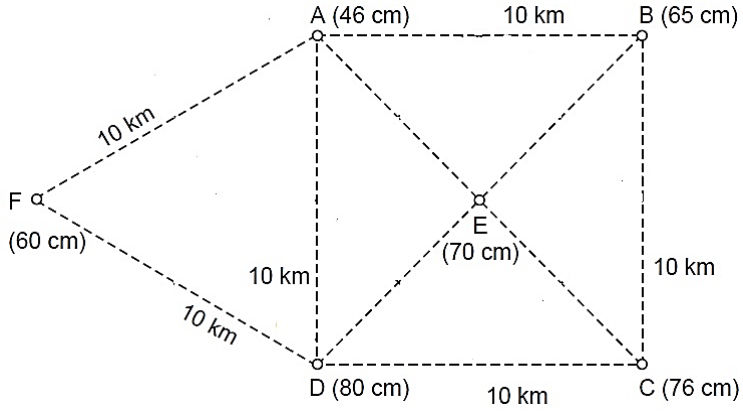
Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 20CV6PCIWR **Max Marks: 100**
Course: Irrigation and Water Resources **Date: 10.07.2023**

Instructions: 1. Answer 5 full questions choosing one full question from units 2 and 5.
2. Assume missing data suitably.
3. Draw neat sketches wherever necessary.
4. Additional normal graph sheets may be supplied.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Explain the factors to be consider in selecting a site for a rain-gauge station.	*CO1*	*PO1*	**04**
	b)		Explain with a neat sketch, the Horton's qualitative representation of hydrologic cycle.	*CO1*	*PO1*	**06**
	c)		The area shown in Figure 1 is composed of a square plus an equilateral triangular plot of side 10 km. The annual precipitations at the rain-gauge stations located at the four corners, center of the square plot and apex of the triangular plot are indicated in figure. Compute the mean precipitation over the area by Thiessen polygon method and compare with the arithmetic mean.  Figure 1.	*CO1*	*PO1*	**10**
			UNIT - II			
2	a)		Describe with a neat sketch the ISI standard evaporation pan.	*CO2*	*PO1*	**06**
	b)		Explain the various factors affecting infiltration capacity of soil.	*CO2*	*PO1*	**06**

	c)	The table below gives the ordinates of a streamflow hydrograph at the outlet of a catchment of area 600 km^2, due to a storm that is believed to have duration of 3 hours. Assuming a constant baseflow of 50 m^3/s, compute the ordinates of a 3-hour unit hydrograph for the catchment.	*CO2*	*PO2*	**08**

Time (Hours)	0	3	6	9	12	15	18
Flow (m^3/s)	50	600	950	700	530	400	310
Time (Hours)	21	24	27	30	33	36	
Flow (m^3/s)	240	190	150	110	80	50	

		OR			
3	a)	Describe the unit hydrograph theory, along with its assumptions and applications.	*CO2*	*PO1*	**06**
	b)	With a neat sketch, explain the working of Double ring Infiltrometer.	*CO2*	*PO1*	**06**
	c)	The rainfall rates for successive 30-minutes intervals up to 4 hours are given below. If surface runoff from the storm is 3.6 cm, establish the φ-index.	*CO2*	*PO2*	**08**

Time (minutes)	0	30	60	90	120	150	180	210	240
Rainfall intensity (cm/hr)	0	1.3	2.8	4.1	3.9	2.8	2.0	1.8	0.9

		UNIT - III			
4	a)	Define the term stage of a river. List the various methods used to measure the stage.	*CO3*	*PO1*	**06**
	b)	Explain the slope-area method for measuring the peak flow in a river.	*CO3*	*PO1*	**06**
	c)	Depth and velocity measurement at different points in a channel cross section are given below. Compute the discharge through the section.	*CO3*	*PO1*	**08**

Distance(m)	0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8
Depth(m)	0	0.3	1.29	2.16	1.68	1.05	0.63	0.42	0
Velocity(m/s) at 0.6d	0	0.21	0.36	0.54	0.51	0.39	0.33	0.30	0

		UNIT - IV			
5	a)	Illustrate a typical Area-Elevation-Capacity curve and discuss its relevance in reservoir planning and operations.	*CO4*	*PO1*	**06**

		b)	Discuss the necessity of irrigation in a tropical country like India.	*CO4*	*PO1*	**06**
		c)	List the advantages and limitations of drip irrigation system.	*CO4*	*PO1*	**08**
			UNIT - V			
	6	a)	A water course has a culturable commanded area of 1200 hectares. The intensity of irrigation for crop A is 40% and for B is 35%, both the crops being Rabi crops. Crop A has a kor period of 20 days and crop B has kor period of 15 days. Calculate the discharge of the water course if the kor depth for crop A is 10 cm and for B it is 16 cm.	*CO5*	*PO2*	**10**
		b)	During a particular stage of the growth of a crop, consumptive use of water is 2.8 mm/day. Determine the interval in days between irrigations, and depth of water to be applied when the amount of water available in the soil is: (i) 25%, (ii) 50% (iii) 75%, and (iv) 0% of the maximum depth of available water in the root zone, which is 80 mm. Assume irrigation efficiency to be 65%.	*CO5*	*PO2*	**10**
			OR			
	7	a)	Calculate in how many days water needs to be supplied to soil (clay loam) in order to ensure efficient irrigation of the given crop, if field capacity of soil = 27%, permanent wilting point = 14%, dry density of soil = 15 kN/m^3, effective depth of root zone = 75 cm, daily consumptive use of water for the given crop = 11 mm and 20% moisture depletion is allowed in the root zone.	*CO5*	*PO2*	**10**
		b)	Using the data given in the table for a given crop, determine the field irrigation requirement for each month assuming irrigation efficiency to be 60%.	*CO5*	*PO2*	**10**

Month	Crop factor, K	Pan Evaporation, E_p (mm)	Effective Rainfall (mm)
November	0.20	118.0	6.0
December	0.36	96.0	16.0
January	0.75	90.0	20.0
February	0.90	105.0	15.0
March	0.80	140.0	2.0

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