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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular End Semester Examination – Summer 2022

Course: B. Tech. **Branch : Civil Engineering** **Semester : IV**

Subject Code & Name: BTCVC404 Water Resources Engineering

Max Marks: 60 **Date: 24/08/2022** **Duration: 3.45 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		
A)	Explain the different methods of distribution of water.	CO1 Understand	6
B)	After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop, if (i) Field capacity of the soil = 28% (ii) Permanent wilting point = 13% (iii) Dry density of soil = 1.3 gm/c.c. (iv) Effective depth of root zone = 70 cm (v) Daily consumptive use of water for the given crop = 12 mm Assume any other data not given.	CO1 Apply	6
C)	The gross command area for a distributary is 6000 hectares, 80% of which is culturable irrigable. The intensity of irrigation for Rabi season is 50% and that for Kharif season is 25%. If the average duty at the head of the distributary is 2000 hectares/cumec for Rabi season and 900 hectares/cumec for Kharif season, find out the discharge required at the head of the distributary from average demand considerations.	CO1 Apply	6
Q.2	**Solve Any Two of the following.**		
A)	What are the different Zones of storage/ control levels in a reservoir? Explain with the help of a diagram.	CO2 Understand	6
B)	Analyse the following failures in Gravity dam:- a) By overturning (or rotation) about the toe b) By crushing (or compression)	CO2 Analyze	6
C)	A proposed reservoir has capacity of 500 ha-m. The catchment area is 125 km2, and the annual stream flow averages 12 cm of runoff. If the annual sediment production is 0.03 ha.m/km^2, what is the probable life of the reservoir before its capacity is reduced by 10% of its initial capacity by sedimentation? The relationship between trap efficiency η (%)	CO2 Apply	6

C/I	0.01	0.02	0.04	0.06	0.08	0.1	0.2	0.3	0.5	0.7
η (%)	43	60	74	80	84	87	93	95	96	97

Q. 3	**Solve Any Two of the following.**		
A)	Explain the components of earthen dam and their functions with the help of a diagram.	CO2 Understand	6
B)	Write a short note on following failures in earthen dam:- a. Hydraulic Failure b. Seepage Failure c. Structural Failure	CO3 Understand	6

C) What are the assumptions and limitations regarding Kennedy's silt theory?

Q.4 Solve Any Two of the following.

A) A catchment has 6 raingauge stations. In a year, the annual rainfall recorded by the gauges are as follows:

Station	A	B	C	D	E	F
Rainfall (cm)	82.6	102.9	180.3	110.3	98.8	136.7

For a 10% error in the estimation of mean rainfall, calculate the optimum numbers of stations in the catchment.

B) The ordinates of 3hr UH of a catchment are given below

Time (hr)	0	3	6	9	12	15	18	21
3 hr UHO (m3/s)	0	10	20	16	12	8	4	0

Derive flood hydrograph at the catchment outlet due to a storm given below. Assume Φ index is 3 mm/hr and constant base flow 10 m^3/s.

Time (hr) for start of storm	0	3	6	9
Accumulated rainfall (cm)	0	3.9	4.7	7.6

C) Explain the following methods to analyze rainfall record data with the help of diagram:

a. Mass Curve of rainfall

b. Hyetograph

Q. 5 Solve Any Two of the following.

A) Explain groundwater movement using Darcy's law.

B) Explain Bligh's Creep Theory and its limitations.

C) What are the causes and ill-effects of water logging?

***** End *****