

Branch : Civil Engineering

Semester : IV

Subject Code & Name: BTCVC404 Water Resources Engineering

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
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Q.1 Solve Any Two of the following.

Q.1 Solve Any Three questions

Q.1 Explain the different methods of distribution of water.

COI **6**
Understand

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/cc

(iv) Effective depth of root zone = 70 cm

(v) Daily consumptive use of water for the given crop = 12 mm

COI
Apply **6**

Assume any other data not given.

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.

COI **6**
Apply

Q.2 Solve Any Two of the following.

Q. What are the different Zones of storage/ control levels in a reservoir? Explain with the help of a diagram.

CO2 6
Understand

B) Analyse the following failures in Gravity dam:-

a) By overturning (or rotation) about the toe

b) By crushing (or compression)

CO2 **6**
Analyze

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/km², 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 (%)

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

CO2 6
Apply

Q3 Solve Any Two of the following.

(A) Explain the components of earthen dam and their functions with the help of a diagram.

CO2 **6**
Understand

(B) Write a short note on following failures in earthen dam:-

a. Hydraulic Failure

b. Seepage Failure

c. Structural Failure

CO3 **6**
Understand

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

CO3
Understand

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

CO3
Apply

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 (m ³ /s)	0	10	20	16	12	8	4	0

CO3
Apply

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 m³/s.

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

CO3
Understand

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

- Mass Curve of rainfall
- Hycograph

Q.5 Solve Any Two of the following.

- A) Explain groundwater movement using Darcy's law.

CO3
Understand

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

CO3
Understand

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

Understand

*** End ***