

**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. **COI 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.
- 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 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)
- C) A proposed reservoir has capacity of 500 ha-m. The catchment area is 125 km<sup>2</sup>, and the annual stream flow averages 12 cm of runoff. If the annual sediment production is 0.03 ha.m/km<sup>2</sup>, 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  $\eta$  (%)

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

**CO2 Analyze 6**

**CO2 Apply 6**

**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?

**CO3**  
Understand

6

**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

6

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 <sup>3</sup> /s)	0	10	20	16	12	8	4	0

**CO3**  
Apply

6

Derive flood hydrograph at the catchment outlet due to a storm given below.

Assume  $\Phi$  index is 3 mm/hr and constant base flow 10 m<sup>3</sup>/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:

- Mass Curve of rainfall
- Hyetograph

**CO3**  
Understand

6

**Q. 5 Solve Any Two of the following.**

- Explain groundwater movement using Darcy's law.
- Explain Bligh's Creep Theory and its limitations.
- What are the causes and ill-effects of water logging?

**CO3**  
Understand

6

**CO3**  
Understand

6

**CO3**  
Understand

6

\*\*\* End \*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Regular/Supplementary Winter Examination – 2025**

**Course: Second Year B. Tech (Sem-IV)      Branch : Civil Engineering      Semester :IV**

**Subject Code & Name: BTCVC404 Water Resources Engineering**

**Max Marks: 60**

**Date: 19/07/2025**

**Duration: 3 Hr.**

**Instructions to the Students:**

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. 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.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
<b>Q. 1</b>	<b>Objective type questions. (Compulsory Question)</b>		<b>12</b>
1	What is the primary purpose of irrigation?	BL2/CO 1	1
	a) Increase rainfall      b) Supply water to crops      c) Drain excess water      d) Improve soil texture		
2	Kennedy's theory is related to:	BL2/CO 1	1
	a) Silt transportation in canals      b) Stability of dams      c) Design of weirs      d) Rainfall measurement		
3	What does a mass curve represent in reservoir planning?	BL2/CO 1	1
	a) Rainfall data      b) Cumulative inflow and outflow      c) Flood frequency      d) Water losses		
4	The useful life of a reservoir is primarily reduced by:	BL2/CO 2	1
	a) Silting      b) Rainfall      c) Evaporation losses      d) Demand curve		
5	Which of the following is a primary function of a gallery in a gravity dam?	BL2/CO 1	1
	a) Enhancing stability      b) Preventing seepage      c) Drainage and inspection      d) Increasing water pressure		
6	Which failure mode is specific to earth dams?	BL2/CO 2	1
	a) Sliding      b) Piping      c) Overturning      d) Arching		
7	The Bligh's creep theory is used to analyze:	BL2/CO 1	1
	a) Silt deposition      b) Seepage in weirs      c) Stability of dams      d) Alignment of canals		
8	What is the primary function of inverted filters in earth dams?	BL2/CO 2	1
	a) To increase drainage efficiency      b) To reduce uplift pressure      c) To minimize seepage      d) To support structural stability		
9	The unit hydrograph is used to determine:	BL2/CO 2	1
	a) Rainfall intensity      b) Catchment area size      c) Runoff response from rainfall      d) Base flow discharge		

10	Which formula is typically used to estimate runoff in a catchment?	BL2/CO 1	1
	a) Darcy's equation      b) Manning's formula      c) Rational method      d) Bernoulli's equation		
11	Flood hydrographs are primarily used to study:	BL2/CO 1	1
	a) Evaporation losses      b) Rainfall distribution      c) Flow variations during a flood      d) Groundwater recharge		
12	Which type of reservoir classification is based on its purpose?	BL2/CO2	1
	a) Single-purpose reservoir      b) Zoned reservoir      c) Overflow reservoir      d) Silting reservoir		
Q. 2	Solve the following.		12
A)	Derive relationship between duty and delta.	BL2/CO 1	6
B)	Differentiate between the lift irrigation and flow irrigation	BL2/CO1	6
Q.3	Solve the following.		12
A)	Explain the process of selecting a site for a reservoir. What are the key factors that influence the site selection for constructing a reservoir?	BL3/CO1	6
B)	Explain elementary profile of gravity dam.	BL3/CO2	6
Q. 4	Solve Any Two of the following.		12
A)	Discuss the components of an earthen dam, their functions, and the design criteria to ensure stability and prevent failure.	BL3/CO2	6
B)	Explain Bligh's creep theory and state its limitations.	BL2/CO2	6
C)	Determine the section of Lacey's regime channel to carry 15 m <sup>3</sup> /s of water in an alluvium with a sediment size of 0.85 mm.	BL4/CO3	6
Q.5	Solve Any Two of the following.		12
A)	Explain the hydrologic cycle and describe the major processes involved in it.	BL2/CO2	6
B)	What is a flood hydrograph, and how is it used to estimate flood flow in a river or stream?	BL3/CO3	6
C)	In a catchment area, there are five existing rain gauge stations. The annual rainfall at these stations is recorded as follows: 500 mm, 700 mm, 400 mm, 750 mm, and 680 mm. The allowable percentage error in the mean rainfall value is 11%. Calculate the optimum number of rain gauges required in the catchment to achieve the desired accuracy.	BL3/CO3	6
Q. 6	Solve Any Two of the following.		12
A)	A tube well is constructed in a basin with a specific yield of 0.35. If the area of influence of the well is 1000 m <sup>2</sup> and the drawdown during pumping is 10 m, calculate the discharge of the tube well. Use Darcy's Law for the calculation.	BL3/CO3	6
B)	Explain with neat sketch rain water harvesting.	BL2/CO3	6
C)	Describe the causes of water logging in irrigated lands. Discuss the preventive and curative measures for it.	BL4/CO3	6
*** End ***			