

**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)
- 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 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.

A) Explain groundwater movement using Darcy's law.

CO3  
Understand

6

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

CO3  
Understand

6

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

Understand

6

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