

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

BTech - IV Semester (CE)

COURSE CODE(CREDITS): 18B11CE414

MAX. MARKS: 35

COURSE NAME: Water Resource Engineering

COURSE INSTRUCTORS: Saurabh Rawat

MAX. TIME: 2 Hours

Note: (a) Attempt any ONE from Q1 (b). All questions are compulsory from Q2 to Q7.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1. (a) Differentiate between Kennedy and Lacey theory based on the concept of 'regime'.

(b) Attempt any ONE from the following questions:

Design an irrigation canal using the following information:

$Q = 45\text{m}^3/\text{s}$; Critical Velocity Ratio (CVR) factor = 1; Longitudinal slope = 16 cm/ 1 km;
Rugosity coefficient (n) = 0.0225

OR

Design an irrigation canal and determine the longitudinal slope 'S' using the following information:

$Q = 45\text{m}^3/\text{s}$; Silt factor = 1; Side slope of the canal = 0.5H: 1V CO5 [2+5 = 7]

Q2. Briefly explain the following terms (*in not more than 3 lines*):

- a). Probably Maximum Precipitation
- b). DAD curve
- c). Saturation Capacity
- d). Probable Maximum Flood
- e). Permanent Wilting Point

CO3, CO4, CO5 [1×5 = 5]

Q3. A river carrying 130 l/s was diverted into a canal and 100 l/s was delivered to the field. What is conveyance efficiency? If the water is delivered to 1.6 ha. land having an available moisture holding capacity of 20cm/m depth of root zone with moisture available at the time of irrigation being equal to 50%, determine the water storage efficiency. Given: Depth of root zone = 1.7 m; Runoff loss = 420 m³; Watering period = 8 hours. CO4 [1+4 = 5]

Q4. Data covering a period of 92 years for a river gives standard deviation of 2951 m³/s and mean flood discharge of 6437 m³/s. Using Gumbel's method, find the flood discharge with return period of 500 years. What is the 80% confidence limit for estimate. Given $\bar{y} = 0.5589$; $S_n = 1.202$.

C%	50	60	70	80	90	95
f(c)	0.674	1.0	1.282	1.648	1.90	2.58

CO3 [5]

Q5. For surface irrigation, prove: $Q = I \times A$, where Q = Discharge from the ditch, I = Infiltration rate and A = Area of the field.

CO4 [5]

Q6. Ordinates of an inflow hydrograph for a stream reach in m³/s at 4-hour interval are as follows: 42, 68, 116, 164, 194, 200, 192, 170, 150, 128, 106, 88, 74, 62, 54. Find the ordinates of outflow hydrograph. The Muskingum coefficients for the stream reach are $k = 12$ hours and $x = 0.278$. Also find the attenuation and lag time.

CO1, CO2, CO3 [3+1+1 = 5]

Q7. A canal was designed for irrigation need of 1000 ha. of land for growing rice with 140 days of base period. The depth of water in the field is 130 cm. If the canal water is used to irrigate wheat having a base period of 119 days and $\Delta = 50$ cm, then how much area can be irrigated?

CO4 [3]