

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
(MID SEMESTER EXAMINATION SP/2025)

CLASS: BTech  
BRANCH: CIVIL

SEMESTER: VI/ADD  
SESSION: SP/2025

SUBJECT: CE302 WATER RESOURCES ENGINEERING

TIME: 02 Hours

FULL MARKS: 25

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- |  |     | CO | BL |
|--|-----|----|----|
| Q.1(a) Explain briefly the distribution of freshwater resources in the world.  | [2] | 1  | 2  |
| Q.1(b) A reservoir had an average surface area of 20 km <sup>2</sup> during June 2024. In that month the mean rates of inflow and outflow were 10 m <sup>3</sup> /s and 15 m <sup>3</sup> /s, respectively. Estimate the evaporation in the month if the monthly rainfall and the change in storage were 10 cm and 16 million m <sup>3</sup> respectively. Assume the monthly seepage loss to be 1.8 cm. | [3] | 1  | 2  |
| Q.2(a) Differentiate between (i) infiltration rate and infiltration capacity and (ii) interception and interflow.  | [2] | 1  | 2  |
| Q.2(b) Describe the salient features of the monsoon in India.  | [3] | 1  | 2  |
| Q.3(a) Draw: (i) Intensity duration curve and (ii) Hyetograph  | [2] | 2  | 2  |
| Q.3(b) The following are the set of data for a storm:<br>Duration (min): 15 30 45 60 75 90 105<br>Rainfall (cm/hr): 2 2 8 7 1.25 1.25 4.5<br>If $\phi=3\text{cm/hr}$ , estimate the net runoff, total rainfall and w-index.  | [3] | 2  | 5  |
| Q.4(a) Describe the Rational Method of maximum flood prediction.   | [2] | 2  | 5  |
| Q.4(b) Based on Isopluvial maps, the 50-year-24-hour maximum rainfall at Ranchi is recorded as 16.0 cm. Calculate the probability of a 24-hour rainfall of 16.0 cm occurring at Ranchi for the following scenarios: (i)once in ten successive years (ii) twice in ten successive years and (iii) at least once in ten successive years.  | [3] | 3  | 5  |
| Q.5(a) What is a unit hydrograph? List the assumptions involved in the unit hydrograph theory.   | [2] | 3  | 2  |
| Q.5(b) Given below are observed flows from a storm of 6-h duration on a stream with a catchment area of 500 km <sup>2</sup>  | [3] | 3  | 2  |

Time (h)	0	6	12	18	24	30	36	42	48	54	60	66	72
Observed flow (m <sup>3</sup> /s)	20	100	250	200	150	100	70	50	45	35	30	25	20

Assuming the base flow to be 20 m<sup>3</sup>/s, derive the ordinates of the 6-h unit hydrograph.

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