

III B. Tech I Semester Supplementary Examinations, June/July-2022 WATER RESOURCES ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) List out various practical applications of hydrology. [8M]
- b) Describe the step by step procedure involved in the analysis for developing Intensity - Duration- Frequency relationships. Sketch a typical set of these curves. [7M]

(OR)

2. a) A catchment has 4 Rain gauge stations. In a year, the annual Rainfall recorded by the gauges is 70 cm, 90 cm, 98 cm, and 100 cm. For a 6% error in the estimation of mean rainfall, determine the additional number of rain gauges required. [8M]
- b) How is the double mass curve technique used to check the consistency? [7M]

UNIT-II

3. a) How evapotranspiration is estimated using penman's equation? [8M]
- b) Table below gives the time distribution of rainfall lasting for 7 hours. [7M]
If the direct runoff is 7.3 cm, determine the ϕ -index of the storm and time of rainfall excess.

| Time (Hours) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| Rainfall in each hour (cm) | 0.7 | 1.4 | 2.4 | 3.7 | 2.9 | 1.7 | 0.5 |

(OR)

4. a) Describe the standard ISI standard Evaporation pan with a neat sketch. [8M]
- b) A 12 hour storm rainfall with the following depths in cm occurred over a basin: 2.0, 2.5, 7.6, 3.8, 10.6, 5.0, 7.0, 10.0, 6.4, 3.8, 1.4 and 1.4. The surface run-off resulting from the above storm is equivalent to 25.5cm of depth over the basin. Determine the infiltration indices for the basin. [7M]

UNIT-III

5. a) Following table gives the ordinates of 2hr- unit hydrograph. Find the ordinates of flood hydrograph if depth of rain fall excess is 10cm, consider constant base flow of 10 m³/sec. [8M]

| Time (Hr) | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
|--|---|----|----|----|----|----|----|
| Ordinates of 2 Hr-UH (m ³ /s) | 0 | 10 | 20 | 30 | 20 | 10 | 0 |

1 of 2

- b) Discuss about various conceptual methods for rainfall – runoff modeling. [7M]

(OR)

6. a) Table below gives ordinates of 3-hr Unit Hydrograph. Derive ordinates of 9-hr Unit Hydrograph for the same catchment. [8M]

| Time(Hrs) | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 |
|--|---|----|----|----|----|----|----|----|----|
| Ordinates of 3-Hr UH (m ³ /sec) | 0 | 10 | 20 | 30 | 40 | 30 | 20 | 10 | 0 |

- b) Draw a single peaked hydrograph and explain various components of hydrograph. [7M]

UNIT-IV

7. a) Explain various flood control methods and management. [8M]
 b) A stream has a uniform flow of 10 m³/s. A flood in which discharge increases linearly from 10 m³/s to 70 m³/s in 6 h and then decreases linearly to 10 m³/s in 24 h from the peak arrives at a reach. Route the flood through the reach in which $k = 10$ h and $x = 0$. [7M]

(OR)

8. a) Discuss about puls method of flood routing. [8M]
 b) Explain in detail about Gumbel's method frequency analysis. [7M]

UNIT-V

9. a) Determine the yield from a 30 cm diameter well under a drawdown of 10 m in the well, if the radius of influence and coefficient of permeability are 150 m and 5 m/day respectively. The aquifer is unconfined with a thickness of 60m. [8M]
 b) How do you estimate yield from an open well by recuperation test method? [7M]

(OR)

10. a) Discuss about storage coefficient, permeability, transmissivity and specific yield. [8M]
 b) Derive the equation of discharge from a tube well fully penetrated into a confined aquifer. [7M]
