



## III B. Tech II Sem Supply End Examination, January 2023

**Hydrology and Water Resource Engineering**

(Civil Engineering)

**Time: 3 Hours.****Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part – A, answer all questions which carries 20 marks.

3. In Part – B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

**PART- A****(10\*2 Marks = 20 Marks)**

- |       |  |    |     |     |
|-------|--|----|-----|-----|
| 1. a) | Draw the hydrological cycle with components.                                   | 2M | C01 | BL1 |
| b)    | Why isohyetal method is efficient in calculating the mean precipitation?       | 2M | C01 | BL1 |
| c)    | Define infiltration indices.   | 2M | C02 | BL1 |
| d)    | What is runoff coefficient and its importance                                  | 2M | C02 | BL1 |
| e)    | What is a hydrograph?  | 2M | C03 | BL1 |
| f)    | What is runoff?  | 2M | C03 | BL1 |
| g)    | What is well losses?   | 2M | C04 | BL1 |
| h)    | Define water table.  | 2M | C04 | BL1 |
| i)    | What is water logging?   | 2M | C05 | BL1 |
| j)    | What is an out let? Write down the requirements that an outlet should fulfill. | 2M | C05 | BL1 |

**PART- B****(10\*5 Marks = 50 Marks)**

- |       |  |    |     |     |
|-------|--|----|-----|-----|
| 2. a) | Write a short note on the following:   | 5M | C01 | BL1 |
|       | i) Intensity- duration –frequency curves.  |    |     |     |
|       | ii) Theoretical probability distribution curves of rainfall.   |    |     |     |
| b)    | Define probable maximum precipitation and discuss how is it evaluated. Indicate the areas of watershed management in which it finds application. | 5M | C01 | BL2 |

**OR**

- |   |  |     |     |     |
|---|--|-----|-----|-----|
| 3 | A catchment has five rainguage stations. In a year, the annual rainfall recorded by the gauges are 78.8 cm, 90.2 cm, 98.6 cm, 102.4 cm and 70.4 cm. For a 6% error in the estimation of the mean rainfall ,determine the additional number of gauges needed. | 10M | C01 | BL3 |
|---|--|-----|-----|-----|

- 4 a) What do you understand by evapotranspiration? How is it determined? 5M C02 BL1  
 b) Briefly discuss about Penman method. 5M C02 BL2
- OR**
- 5 A 12 - hour storm rainfall with the following depths in cm occurred over a basin: 10M C02 BL3  
 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 25.5 cm of depth over the basin. Determine the average infiltration index for the basin.
- 6 a) What do you understand by unit hydrograph? How is it derived? 5M C03 BL1  
 b) Briefly discuss about S- hydrograph along with neat sketch. 5M C03 BL2
- OR**
- 7 Explain the method of determining direct run-off from a given storm hydrograph. 10M C03 BL4
- 8 a) Briefly explain the Darcy's law 2M C04 BL4  
 b) An aquifer of 20 m average thickness is overlain by an impermeable layer of 30 m thickness. A test well of 0.5 m diameter and two observations well at a distance of 10 m and 60 m from the test - well are drilled through the aquifer. After pumping at a rate of 0.1 m<sup>3</sup>/sec for a long time, the following drawdowns are stabilized in these wells: First observation well 4 m; second observation well 3 m. Show the arrangement in a diagram. Determine the coefficient of permeability and drawdown in the test well. 8M C04 BL3
- OR**
- 9 Discuss the various methods of surface and sub-surface water applications to the field 10M C04 BL2
- 10 a) What is lining of canal? Explain the types of lining and write its advantages. 5M C05 BL4  
 b) What do you know about Kennedy's gauge outlet and explain the use of it. 5M C05 BL4
- OR**
- 11 A lined irrigation canal with trapezoidal cross - section has 5 m bed width, 2.5 m depth and 1.5 (H) :1 (V). Longitudinal bed slope of the canal is 1 in 1000 and Manning's n = 0.16. What is the maximum carrying capacity of the canal? What area of land in hectares the canal can irrigate if the crop has 150 mm field irrigation requirement in a Kor period of 10 days. 10M C05 BL3