

Code No: 125AC

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, November/December - 2017

WATER RESOURCES ENGINEERING-I

(Common to CE, CEE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) Define the terms interception loss and base flow. [2]
- b) What is hydrograph? Draw a single peaked hydrograph and explain its components? [3]
- c) What are the different types of aquifers? [2]
- d) Write a short note on sprinkler method of irrigation. [3]
- e) Describe with the help of a diagram, various forms of a soil moisture. What do you understand by the available moisture? [2]
- f) Explain various types of canals, according to various classification systems. [3]
- g) Differentiate between ground water flows and inter flow. [2]
- h) Write short notes on infiltration indices. [3]
- i) Define S-Curve hydrograph. What are its uses? [2]
- j) Distinguish between influent stream and effluent stream. [3]

PART - B

(50 Marks)

- 2.a) What do you understand by precipitation? Explain various types of precipitation.
- b) Find out the ordinates of a storm hydrograph resulting from a 3hr storm with rainfall of 3, 4.5 and 1.5cm during subsequent 3 hours intervals. The ordinates of unit hydrograph are given in the table below. Assume an initial loss of 5mm, infiltration index of 5mm/hour and base flow of 20cumecs. [5+5]

| Hours | 0 | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 03 | 6 | 09 | 12 |
|---------------------------------------|---|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|
| Ordinates of unit hydrograph (cumecs) | 0 | 90 | 200 | 350 | 450 | 350 | 260 | 190 | 130 | 80 | 45 | 20 | 0 |

OR

- 3.a) What are the factors affecting infiltration? Discuss their effect in producing variation in infiltration rate during a storm, and also in producing seasonal and spatial variations in infiltration rate.
- b) Describe the ISI standard evaporation pan with a neat sketch. In what way it is different from USWB class A land pan? [5+5]

- 4.a) What are the various components of runoff? Describe how each component is derived in the runoff process?
- b) The hourly ordinates of a two hour unit hydrograph are given below. Derive a 6-hour unit hydrograph for the same catchment. [5+5]

| Time (Hours) | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Discharge (cumecs) | 0.0 | 1.0 | 2.7 | 5.0 | 8.0 | 9.8 | 9.0 | 7.5 | 6.3 | 5.0 | 4.0 | 2.9 | 2.1 | 1.3 | 0.5 | 0.0 |

OR

5. What do you understand by unit hydrograph? How is it derived? Explain its use in construction of flood hydrograph resulting from two or more periods of rainfall? [10]

- 6.a) Explain the terms
 i) Porosity
 ii) Specific yield
 iii) Permeability
- b) Explain Darcy's law. List out the assumptions made in the analysis of steady radial flow into well. [5+5]

OR

- 7.a) Explain the terms
 i) Cone of depression
 ii) Radius of influence
 iii) Drawdown
- b) When 3.68 million m³ of water was pumped out from an unconfined aquifer of 6.2km² areal extent, the water table was observed to go down by 2.6m. What is the specific yield of the aquifer? During a monsoon season if the water table of the same aquifer goes up by 10.8m, what is the volume of recharge? [5+5]

- 8.a) Write a short notes on the following:
 i) Saturation capacity
 ii) Field capacity
 iii) Wilting point
 iv) Optimum water.
- b) What are the factors affecting duty? How can duty be improved? [5+5]

OR

- 9.a) Discuss in brief various methods of surface irrigation.
 b) Explain consumptive use and water logging. What are irrigation efficiencies? [5+5]

- 10.a) For a channel, the discharge Q, rugosity coefficient N, critical velocity ratio m, and the bed width-depth ratio B/D are given. Explain how would you design the channel using Kennedy's theory?

- b) How do you measure and estimate stream flow? [5+5]

OR

- 11.a) Using Lacey's theory, design an irrigation channel for the following data:

Discharge Q=50cumecs

Silt factor f=1

Side slopes = $\frac{1}{2} : 1$

- b) What is flood frequency analysis? How do you compute design discharge over a catchment? [5+5]