

R16

Code No: 135BT

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, December - 2019

WATER RESOURCES ENGINEERING

(Civil Engineering)

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) Show the various components of hydrological cycle by means of neat sketch. [2]
- b) State the various methods adopted to determine the runoff from a catchment. Highlight the advantages of each. [3]
- c) What is a S-curve hydrograph? [2]
- d) Highlight various assumptions and limitations of hydrographs. [3]
- e) Define the terms: Capillary fringe and Aquiclude. [2]
- f) What is meant by tube wells? [3]
- g) Enumerate the objectives of irrigation. [2]
- h) What are the reasons for water logging? [3]
- i) State the advantages of canal lining. [2]
- j) Discuss the methods available for computation of design discharge. [3]

PART - B

(50 Marks)

- 2.a) Explain the procedure involved in computation of mean rainfall over a drainage basin using Thiessen's method and Isohyetal method.
- b) A reservoir with surface area of 450 hectares has the following meteorological values. Estimate the average daily evaporation from the lake reservoir, and the volume of water evaporated from the lake. Use Meyer's formula and Rohwer's formula. Take water temperature as 35°C , relative humidity as 60%, and wind velocity at 1.55m above ground as 13km/h, and mean barometer reading as 760mm of Hg. [5+5]

OR

- 3.a) What are different factors affecting infiltration capacity? Discuss them in brief.
- b) Estimate the potential evapotranspiration using Penman Method for the following data: Month - September, latitude - 28°N , Elevation - RL 220m above mean sea level, mean temperature - 42.5°C , actual sunshine hours - 13h, wind velocity at 4m height - 165km/day, mean relative humidity - 45%. Assume any other data suitably. [5+5]

4.a) Explain step by step, the method of construction of unit hydrograph from storm of unit duration stating the basic assumptions.

b) The Instantaneous Unit Hydrograph of a drainage basin is a triangle with the base 36 hours and a peak of 45 cumec at 8 hours from the start. Determine 2 hour unit hydrograph. [5+5]

5. In a typical 4 hour storm producing 100mm of runoff from a basin, the stream flow observed is as follows. Estimate the peak flow in the stream and the time of its occurrence in a flood created by an 8hr storm that produces 60mm of runoff during the first four hours and 95mm of runoff during the second four hours. Assume that the base flow is negligible. [10]

Time in hrs	0	2	4	6	8	12	16	20
Flow in cumecs	0	3.56	9.24	15.89	13.50	8.10	6.50	2.34

6.a) Explain the step by step process involved in the construction of wells.

b) A 30cm dia well penetrates 17.5m below the static water table. After 24hrs of pumping at 5500lpm, the water level in a test well at 125m away is lowered by 0.75m, and in a well at 32.5m away, the drawdown is 1.25m. What is the transmissibility of the aquifer? [5+5]

7.a) Differentiate between shallow dug wells and deep dug wells.

b) Define Dupit's equation. State the assumptions that enter in its development. Also explain Theim's formula. [5+5]

8.a) Explain as how the temperature, soil and sub-soil condition, rainfall factors affect the duty of the crop.

b) Discuss in brief various soil moisture constants. [5+5]

9.a) Derive the equation to determine the relationship between duty, delta and base period.

b) What are the advantages, disadvantages and limitations of Furrow Irrigation and check basin methods of Irrigation? [5+5]

10.a) Design an irrigation canal for the discharge of 25 cumecs, $N = 0.0225$, $m = 1$ and the ratio of $B/D = 5.5$. Use Kennedy's method. [5+5]

b) Explain in detail different types of canal lining materials. [5+5]

11.a) Enumerate the design steps and drawbacks involved in channel design using Kennedy's method.

b) Design a lined canal to carry a discharge of 20cumec. The available slope is 1 in 8500. The side slopes of the channel are to be taken as 1.5:1. The canal is made of brick lining. [5+5]