Code No: 135BT

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, November/December - 2018
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) How do you process the rainfall data? Explain the procedure involved in it. [2]
b) What are the factors affecting runoff over a catchment. [3]
c) State how S-curve is constructed and when it is adopted. [2]
d) Enumerate various methods used for estimating flood discharge from a catchment. [3]
e) State the significance of well development towards groundwater occurrence. [2]
f) Define the term: Well Efficiency, Porosity and specific yield. [3]
g) List out the various ill-effects of irrigation. [2]
h) Develop the relation between depth and frequency of irrigation. [3]
i) Enumerate the drawbacks of Kennedy's theory of design of canals. [2]
j) Show the components of balancing depth of cutting. [3]

PART - B

(50 Marks)

2.a) Explain the procedure involved in the computation of average rainfall over a basin with suitable example.
b) The infiltration capacity of an area at different intervals of time are indicated below. Find an equation for the infiltration capacity in the exponential form. [5+5]

Time in hours	0	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Infiltration capacity in cm/hr	21.8	7.50	5.40	3.72	2.12	1.30	1.55	1.55	1.65

OR

3.a) Explain in detail the various constituents of runoff.
b) Discuss in brief the Pan Measurement method and Energy Budget method of measurement of evaporation. [5+5]

4. The following are the ordinates of a 3hr unit hydrograph. Derive the ordinates of a 6hr unit hydrograph and plot the same. [10]

Time (hr)	0	3	6	9	12	15	18	21	24	27	30
3hr. UGO (cumec)	0	2.0	5.0	9.6	13	10.4	5.8	3.3	1.9	0.5	0

OR

5.a) Define and explain briefly concept of a unit hydrograph.

b) The peak of a flood hydrograph due to a 6hour storm is 675cumecs. The average depth of rainfall is 9.75cm. Assume an infiltration loss of 0.75cm/hr and a constant base flow of 20cumecs. Estimate the peak discharge of a 6hr unit hydrograph for the catchment. [5+5]

6.a) With a neat sketch, explain any two types of wells adopted in groundwater analysis.

b) Two identical tube wells fully penetrating a 25m thick aquifer are located at 160m apart. The tube wells have diameter of 45cm, radius of influence of 390m and the coefficient of permeability of aquifer is 10^{-3}m/sec. Compute discharge of tube well when only one is working with a drawdown of 9.5m and percentage decrease in discharge of the well, if both are working with a drawdown of 6.5m. [5+5]

OR

7.a) Explain different types of aquifers with neat sketch.

b) Derive the equation to determine the radial flow to wells in an unconfined aquifer. [5+5]

8.a) Discuss in detail different water application methods along with advantages and disadvantages of each method.

b) A volume of 475 Mm^3 of storage was able to irrigate a land of 40,000 hectares. The crop season is estimated to be 120 days. Estimate the duty of the crop. [5+5]

OR

9.a) What is meant by "duty of water"? Also enumerate the vertical distribution of soil-moisture highlighting the soil moisture constants.

b) Discuss in brief the factors responsible for improving the soil fertility. [5+5]

10.a) Derive the Perimeter-Discharge relation, V-Q-f relation of Lacey's theory.

b) How do you control the weed growth in canals? Explain. [5+5]

OR

11.a) Design an irrigation channel in alluvial soil according to Lacey's theory with full supply discharge as 15cumecs, f = 1.0, channel side slopes as 1.5:1.

b) Derive an expression for balancing depth. [5+5]

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