R18

Code No: 156BF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, March - 2024
HYDROLOGY AND WATER RESOURCES ENGINEERING
(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) 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

(25 Marks)

1.a)	What is meant by Probable Maximum Precipitation?	[2]
b)	What are the primary methods used for estimating mean precipitation over an area?	[3]
c)	How is evapotranspiration different from evaporation?	[2]
d)	Define infiltration and factors affecting infiltration?	[3]
e)	What are the factors affecting runoff?	[2]
f)	What information does a hydrograph provide?	[3]
g)	Distinguish between aquifer and aquifuge.	[2]
h)	Define the yield of an aquifer? List the factors affecting the yield.	[3]
i)	What is meant by a non-modular outlet?	[2]
j)	Why is canal lining important?	[3]

PART – B

(50 Marks)

2.a) Describe various types and forms of precipitation.
b) Describe the principle of weighing bucket type recording rain gauge with a neat sketch. Discuss its advantages and disadvantages. [5+5]

OR

3.a) Major river basin is divided into four sub basins with areas of 920, 705, 1075 and 1665 Km^2. If the average annual rainfall on these sub basins is 73, 85, 112 and 100 cm respectively. What is the average rainfall for the basin as a whole?
b) What are the possible sources of error in measurement of rainfall? [5+5]

4.a) Discuss various methods of reducing evaporation from a water body.
b) Define φ-index and W-index and bring out the differences between. How is the φ-index determined from the rainfall hyetograph? [5+5]

OR

5.a) A storm with a uniform intensity of 1.6 cm/hr for a period of 8 hours occurring over a basin of area 650 km^2 produced a runoff estimated to be 57.2 million m^3. Find the average infiltration rate during the storm.
b) What is Runoff? Differentiate between runoff and base flow. [5+5]

6.a) Why is baseflow separated from total runoff?

b) Define Unit hydrograph. What are the assumptions underlying the Unit hydrograph theory? How do they limit the applicability of Unit hydrograph? [5+5]

OR

7.a) The 3h Unit hydrograph of a basin can be approximated as a triangle with a base period of 75h and a peak discharge of 55.5 m^3/s. What is the area of the basin? At what time the peak discharge occurs?

b) What is a S-curve hydrograph? How is it constructed? What are its uses? [5+5]

8.a) Distinguish between hydraulic conductivity and intrinsic permeability, specific yield and storage coefficient.

b) Find the field capacity of a soil for the following data:

i) Depth of root zone = 2m

ii) Existing water content =6%

iii) Dry density of soil = 1400 kg/ m^3

iv) Water applied to soil = 500 m^3

v) Water lost due to evaporation and deep percolation = 10 %

vi) Area of land irrigated = 1000 m^2. [5+5]

OR

9.a) Explain how the yield of an open well can be determined using recuperation test.

b) In a water table aquifer of 50 m thickness, a 20 cm diameter well is pumped at a uniform rate of 0.05 m / s. If the steady state drawdown measured in the observation wells located at 10 m and 100 m distances from the well are 6.5 m and 0.25 m respectively, determine the hydraulic conductivity of the aquifer. [5+5]

10.a) What is waterlogging ? What are the ill-effects of waterlogging?

b) What is canal lining? Discuss the advantages and disadvantages of canal lining. [5+5]

OR

11. Design a concrete lined channel of trapezoidal section to carry a discharge of 250 cumecs at a slope of 1 in 6000. The side slopes of the channel are to be made as 1.5: 1 and a limiting depth of 3 m is to be maintained. Take N for the lining material as 0.015. [10]

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