PAPER ID-311057

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM V) THEORY EXAMINATION 2024-25
ENGINEERING HYDROLOGY

TIME: 3 HRS **M.MARKS: 100**

Note: Attempt all Sections. In case of any missing data, choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	CO	Level
a.	List the forms of precipitation.	1	K1
b.	What is the difference between depression storage and interception?	1	K1
c.	What is the difference between a synthetic unit hydrograph and an instantaneous unit hydrograph?	2	K1
d.	What is the significance of the peak discharge in a flood hydrograph?	2	K1
e.	What is the empirical formula used in flood frequency studies? Provide one example.	3	K1
f.	What is meant by a design storm and how is it used in hydrology?	3	K1
g.	Define hydraulic conductivity of an aquifer and state its units.	4	K1
h.	What is partially penetrating well?	4	K1
i.	What are well losses? Explain the factors that contribute to well losses.	5	K1
j.	Explain the principles of groundwater modeling. How can models be used to predict the effects of contamination and assist in groundwater management?	5	K2

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

Q no.	Question	CO	Level
a.	Explain the water budget equation in detail and discuss how it helps in understanding water availability and consumption in a region.	1	K2
b.	The ordinates of storm hydrograph of a particular catchment are given below. Determine the ordinates of unit hydrograph and rainfall excess. Take catchment area as 50 km^2.	2	K3
c.	Analyze the effect of flood frequency analysis on the design of flood control infrastructure in areas with varied land use.	3	K4
d.	A field test for permeability consists in observing the required for a tracer to travel between two observation wells. A tracer was found to take 10-hour travel between two wells 50 m apart when the difference in the water surface elevation in them was 0.5 m. The mean particle size of aquifer is 2 mm and the porosity of the medium is 0.3. If kinematic viscosity is 0.01cm^2 /s. Estimate the coefficient of permeability and intrinsic permeability of the aquifer	4	K3
e.	What is the role of GW in hydrologic cycle? Provide the water balance equation and highlight the GW related components in it.	5	K5

Time hr	0	1	2	3	4	5	6	7	8
SHO m^3/s	10	30	40	60	80	70	55	40	10
Base Flow m^3/s	10	10	10	10	10	10		10	10

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SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Apply the concept of the water balance equation to a given watershed, incorporating data for precipitation, evaporation, infiltration, and initial losses.	1	K3
b.	Using the data for a specific region, calculate the infiltration capacity and its effect on groundwater recharge during a rainstorm.	1	K3

4. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Apply the concept of mass curve to estimate the cumulative runoff for a specific storm in a watershed.	2	K3
b.	Compare the characteristics of flood hydrographs for two different catchment areas, analyzing how the time of concentration and land use influence the peak discharge.	2	K4

5. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Describe the method of determining the aquifer parameters using the pumping test data.	3	K2
b.	Draw a neat sketch and show the various types of aquifers, confining units, wells and interfaces in them along with their equivalent terminology	3	K5

6. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Explain the difference between steady-state flow and unsteady-state flow in an aquifer, using an example.	4	K2
b.	Given a system of multiple wells, analyze the effect of mutual interference and calculate the resulting drawdown at a specific well.	4	K4

7. Attempt any *one* part of the following: 10 x 1 = 10

Q no.	Question	CO	Level
a.	Explain in detail the Components of a rooftop rainwater harvesting system.	5	K4
b.	Analyze a groundwater contamination case study where industrial activity is the primary cause. Discuss the steps taken to control and remediate the contamination.	5	K4