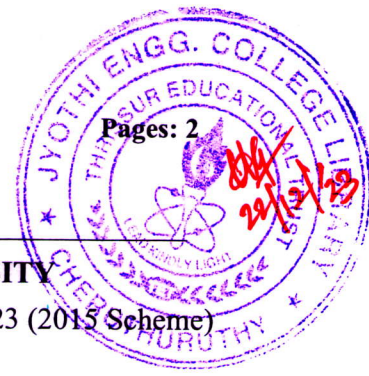


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Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (S, FE) / S3 (PT) (S, FE) Examination December 2023 (2015 Scheme)

Course Code: CE309

Course Name: WATER RESOURCES ENGINEERING

Max. Marks: 100

Duration: 3 Hours

*Graph sheets may be provided*

**PART A**

*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) What are the different types of precipitation? Explain the mechanism of precipitation. (4)  
b) Define infiltration rate and infiltration capacity. Explain Horton's infiltration curve. (5)  
c) What are the factors influencing runoff in a catchment area? (6)
- 2 a) A rain gauge recorded the following accumulated rainfall during the storm. Draw the mass rainfall curve and the hyetograph (5)

Time (AM)	8:00	8:30	9:00	9:30	10:00	10:30	11:00
Accumulated rainfall (mm)	0	2	8	12	15	19	22

- b) What is baseflow? What are the methods of baseflow separation in a hydrograph? (6)  
c) Explain double ring infiltrometer with a sketch. (4)
- 3 a) Define infiltration indices (3)  
b) What are the assumptions and limitations of unit hydrograph theory (5)  
c) Given below are the ordinates of a 2 hour unit hydrograph. Construct and plot a 8 hour unit hydrograph from it. (7)

Time (hr)	0	1	2	3	4	5	6	7	8	9	10
Discharge (m <sup>3</sup> /s)	0	10	22	30	16	10	6	3	1	0.5	0

**PART B**

*Answer any two full questions, each carries 15 marks.*

- 4 a) List various factors affecting duty of water. (6)  
b) Differentiate flow and lift irrigation systems. (4)  
c) Explain guide banks with sketches (5)
- 5 a) The gross commanded area for a distributary is 10000 hectares, 75 % of which can be (5)

irrigated. The intensity of irrigation for Rabi season is 60 % and that for Kharif season is 30 %. If the average duty at the head of the distributary is 2500 hectares per cumec for Rabi season and 1000 hectares per cumec for Kharif season, determine the discharge required at the head of the distributary from average demand consideration.

- b) Explain stream flow measurement by area velocity methods (5)
- c) What are levees? Explain the significance of it for river training. (5)
- 6 a) Define consumptive use of water. What are the factors affecting it? (5)
- b) After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop, if (5)
- i. Field capacity of the soil = 30 %
  - ii. Permanent wilting point = 16 %
  - iii. Density of soil = 1.25 g/cc
  - iv. Effective depth of root zone = 80 cm
  - v. Daily consumptive use of water for the given crop = 14 mm
  - vi. Permissible depletion of available moisture = 75%
- c) Explain the use of pitched island with the help of figure, for the river training works. (5)

### PART C

*Answer any two full questions, each carries 20 marks.*

- 7 a) What are the storage zones in a reservoir? Explain with a neat sketch. (7)
- b) Define porosity, specific yield and specific retention. Establish a relation between them. (5)
- c) Stating the assumptions, derive the expression for the discharge from a well in a confined aquifer. (8)
- 8 a) How do you find the storage capacity of a reservoir using a mass curve? (8)
- b) Differentiate artesian and non-artesian aquifer with a suitable sketch. (6)
- c) A 0.5 m diameter well fully penetrates an unconfined aquifer whose bottom is 85 m below the undisturbed ground water table. When pumped at a steady rate of 1.50 m<sup>3</sup>/min., the drawdowns observed in two observation wells at radial distances of 6m and 15m are respectively 5.2 and 3 m. Determine the draw down in the well. (6)
- 9 a) What is a reservoir? Differentiate retarding reservoir and detention basins. (7)
- b) Explain the necessity of storage and diversion systems in surface water. (5)
- c) (i) Define coefficient of permeability and transmissibility. (8)
- (ii) A well of diameter 30 cm fully penetrates a confined aquifer of thickness 15 m. when pumped at a steady rate of 30 lps., the drawdowns observed in wells at radial distances of 10 m and 40 m are 1.50 and 1.0 m respectively. Compute permeability and transmissibility at the well.

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