B.E.C.E. 2ⁿᵈ YEAR EXAMINATION, 2024
(2ⁿᵈ Semester)
SUBJECT: Water Resource Engg.-I

Full Marks 100

Time: Three hours

Use a separate Answer-Script for each part

No. of Questions	Part I (60 Marks)	Marks

Part I (60 Marks)

Marks

Answer all the questions. Answer should be brief and to the point. All the notations have their usual meaning. Assume relevant data if not provided. All the relevant drawings should be in pencil.

Section-A (Related to CO-2)

Q1. With two examples explain how human intervention affects hydrological cycle. Writing two characteristic features only differentiate between evaporation and evapotranspiration. Writing two characteristic features only differentiate between infiltration capacity and field capacity. The recurring period of 24 hour maximum rainfall of 160mm for Kolkata is 15 years. Determine the probability of a 24 hour rainfall equal to greater than 160 mm at Kolkata (i) not occurring and (ii) at least occurring once in 25 successive years. — 2×5

Q 2.a) Plot (i) Depth-area-duration curves, (ii) Maximum intensity-duration-frequency curves. — 2

b) **Match the following:**

1×4

Section A	Section B
Evaporation	Penman's equation
Precipitation	Dalton's equation
Evapotranspiration	Philip's equation
Infiltration	Symon's instrument

c) **Write true and false with proper justification. <u>No marks will be given if justification will not be written.</u>** — 1.5×4

(i) Rate of evaporation will decrease if atmospheric pressure will increase.

(ii) Infiltration capacity will increase for moist clay soil.

(iii) Interception loss is maximum for banyan tree for rainfall with more frequency and intensity.

(iv) At permanent wilting point AET/PET is zero.

d) **Fill in the blanks:**

(i) In extratropical cyclone in the northern hemisphere the wind flows in _____direction. — 1×3

(ii) A plot between cumulative rainfall depth versus time is called_____

(iii) Consistency of rainfall is checked by _____

B.E.C.E. 2nd YEAR EXAMINATION, 2024
(2nd Semester)
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No. of Questions	Part I (60 Marks)	Marks

Q 3.a) The infiltration capacity of a soil for a small catchment area was found to be 3cm/h before a rainfall event. It was found to be 1.5cm/h at the end of 10 hours. If the total infiltration during the 10 hours period of rainfall event was 20 cm determine the Horton's decay coefficient.   **5**

b) Determine and plot φ-index for the given data graphically if the precipitation produced a direct runoff of 3.5 cm at the outlet of the catchment area.   **10**

Time from start (h)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Cumulative rainfall (h)	0	0.25	0.5	1.1	1.6	2.6	3.5	5.7	6.5	7.3	7.7

Section-B (Related to CO-3)

Q4.a) Explain briefly the following terms: specific storage and hydraulic resistance.   **2×2**

b) **Write true or false with proper justification. <u>No marks will be given if justification will not be written</u>:**   **1.5×4**

    i.   If the top layer of a confined aquifer is made up of aquiclude then it is known as leaky aquifer.

    ii.   Darcy's velocity and pore velocity are same.

    iii.   Dimension of transmissivity is [L].

    iv.   Rate of recovery is more for unconfined aquifer compared to confined.

c) A 30cm well fully penetrates in a confined aquifer of saturated thickness 20m. Under a steady pumping rate for long time the drawdowns at two observation wells 15m and 30m away from the well are 5m and 4.m respectively. If the coefficient of the permeability of the aquifer is 25m/day, determine the rate of discharge and drawdown at the pumping well with neat sketch and deducing the expression.   **2+3+5**

B.E. in Civil Engineering 2nd Year 2nd semester Supplementary Examinations, 2023-24
SUBJECT: Water Resources Engineering - I

Time: 3 Hours   **Full Marks: 100**

PART-II (40 Marks)

No. of Q		Assume any reasonable values to data not given	Marks
CO1			
1.		Describe any 2 (two) in maximum 5 (five) sentences	5×2
	a)	Electromagnetic method of streamflow determination	
	b)	Hysteresis in tidal river flow	
	c)	Current meter	
2.		A 30 g/l solution of a non-toxic dye was discharged into a natural stream at a constant rate of 15 cm^3/s. The background concentration of the dye in the stream water was found to be zero. At a downstream section sufficiently far away from the injection point, the dye was found to reach on equilibrium concentration of 7 parts per billion. Estimate the stream flow rate.	5
CO4			
3.		Draw the complete diagram of different routes of Runoff and mark each component.	10
4.		Below are monthly average rainfall, P and the corresponding runoff values covering a period of 12 months for a river catchment. Develop a correlation between P and R.	5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
P	6	8	25	30	22	2	8	10	30	36	31	5
R	0.5	1.5	7.6	9.4	6.5	0	1.6	2.3	8.0	16.0	12.0	0.1

No. of Q	Assume any reasonable values to data not given	Marks
5.	What is a D-h Unit Hydrograph? Explain with detailed figure and assumptions.	6
6.	Write a brief note on the different methods of baseflow separation of a surface-flow hydrograph.	4