Reg. No.

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B.E / B.TECH. DEGREE EXAMINATION, MAY 2023

Eighth Semester

CE18030 – WATER RESOURCES ENGINEERING

(Civil Engineering)

(Regulation 2018)

TIME: 3 HOURS   **MAX. MARKS: 100**

CO 1   The students will be able to describe the basic principles of hydrology.

CO 2   The students will be able to summarise the basics of different type of hydrographs.

CO 3   The students will be able to explain the concepts of groundwater and hydraulics of subsurface flows.

CO 4   The students will be able to enumerate the strategies involved in water resources planning and fundamentals of flood.

CO 5   The students will be able to describe Planning, design, operation and management of reservoir system.

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Enlist the different forms of precipitation.	1	1
2.	How does Runoff occur? How is it measured?	1	2
3.	Define the term "Time of Concentration"	2	1
4.	Why is baseflow separated from the flood hydrograph in the process of developing a unit hydrograph?	2	2
5.	A soil sample was found to have a porosity of 50% and specific yield as 15 %. Determine the Specific retention.	3	3
6.	Enumerate the difference between Aquitard and Aquifuge.	3	2
7.	Define design flood.	4	1
8.	Write down Dickens and Ryves formula to estimate the maximum flood discharge.	4	1
9.	Distinguish between storage and retarding reservoir.	5	2
10.	What is flood routing?	5	1

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL

11. (a) A catchment area of size 25 km X 25 km has five rain gauge stations. The storm rainfall and coordinates of the station are as follows: **(14)**   **1**   **3**

Station	Station coordinates	Normal Annual rainfall (cm)	Storm rainfall (cm)
G1	0,25	138	10
G2	25,25	125	12
G3	25,0	134	13.5
G4	0,0	140	14.3
G5	12.5,12.5	110	?
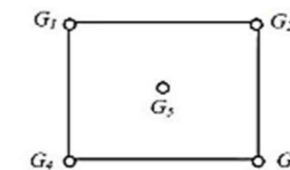
i) Compute the missing rainfall of station G5(Station positioned at center) by
     (a)Arithmetic mean method. (b) Normal ratio method

ii) Also compute the average rainfall by
     (a) Thiessen Polygon (b) Arithmetic mean method.

(OR)

11. (b) The following is the set of observed data for successive 15 minutes' period of 105 minutes' storm in a catchment: **(14)**   **1**   **3**

Duration (min)	15	30	45	60	75	90	105
Rainfall (cm/hr)	2	2	8	7	1.25	1.25	4.5

If the value of φ – index is 3cm/hr, Estimate the net runoff, The total rainfall and value of W-Index

12. (a) **(i)** Given the ordinates of a 4-h unit hydrograph as below derive the ordinates of a 8-h unit hydrograph for the same catchment.   **(10)**   **2**   **3**

Time (hrs)	0	4	8	12	16	20	24	28	32	36	40	44
4 hr -UH ordinate (cumec)	0	20	80	130	150	130	90	52	27	15	5	0

\   **(ii)** What is a unit hydrograph? List the assumptions made in the unit hydrograph theory.   **(04)**   **2**   **2**

(OR)

(b) The ordinates of a 4-hr UH at a site on a river are given below.   **(14)   2   3**

Time(hrs)	0	2	4	6	8	10	12	14	16	18	20	22
Ordinates of UH (cumecs)	0	25	100	160	190	170	110	70	40	28	13	0

Develop a summation hydrograph(S-Curve) for the river site. Derive the ordinates of a 2 hr-UH for the site.

13. (a) A 30 cm dia tube well is bored in an unconfined aquifer having saturated   **(14)   3   3**
thickness 40m.The yield from the well is 2000lpm.The drawdown in two
observation wells located at 20 m and 80m are 2m and 1m respectively.
Determine
(i)Transmissivity
(ii)Drawdown in the pumping well.

(OR)

(b) Derive the expression to determine the discharge in a steady radial flow into a   **(14)   3   3**
confined aquifer. State its assumptions also

14. (a) Explain key factors to be considered in water resources planning, Highlighting   **(14)   4   2**
the allocation priorities of water

(OR)

(b) Explain briefly about irrigation requirements of water.   **(14)   4   2**

15. (a) What are the various investigations required for reservoir planning? Discuss in   **(14)   5   2**
brief.

(OR)

(b) Define storage capacity of the reservoir, also list out and explain the different   **(14)   5   2**
storage zones of reservoir with neat sketch.

PART- C (1 x 10 = 10 Marks)
(Q.No.16 is compulsory)

	Marks	CO	RBT LEVEL

16. On the basis of isopluvial maps, the 50 year-24 hr maximum rainfall at a place   **(10)   1   3**
is found to be 15 cm.Determine the probability of a 24 hr rainfall of magnitude
15cm occurring at the same place
(i)   Once in 10 successive years
(ii)   Twice in 10 successive years
(iii)   At least once in ten successive years