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B.TECH.
(SEM-VII) THEORY EXAMINATION 2021-22
ENGINEERING HYDROLOGY

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

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

- a. What do you mean by rain gauge network?
- b. How vapor pressure effects the evaporation.
- c. Explain Φ -Index.
- d. Define AET and PET.
- e. Define effluent and influent streams with diagram.
- f. Draw a Hydrograph showing its integral components?
- g. Write the formula involved in Gumbel's method of flood routing.
- h. What do you mean by envelop curve.
- i. What is specific yield?
- j. What is Aquiclude and Aquitard?

SECTION B

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

- a. Explain the water budget method of evaporation estimation.
- b. Explain flooding type infiltrometer along with neat sketch.
- c. Ordinates of 4-hr unit hydrograph for area 630 km² are given below. Derive the ordinates of 2-hr unit hydrograph using S-Curve method.

T (hr)	0	2	4	6	8	10	12	14	16	18	20	22	24
Q(m ³ /s)	0	25	100	160	190	170	110	70	30	20	6	1.5	0

- d. An urban catchment has an area of 0.85 km². The slope of the catchment is 0.006 and the maximum length of travel of water is 950 m. the maximum depth of rainfall with a 25-year return period is below:

Duration (min)	5	10	15	30	40	60
Depth of rainfall	17	26	40	50	57	62

If a culvert for drainage at the outlet of this area is to be designed for a return period of 25 year, Determine the required peak flow rate, by assuming coefficient as 0.3.

- e. Discuss the principle of recuperation test of an open well.

SECTION C

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

- (a) Explain different forms of precipitation. What is the difference between cyclones and anti-cyclones?
- (b) How to calculate the mean precipitation over an area using Thiessen polygon method. Explain with the help of neat sketch.

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

- (a) A storm of 10 cm of precipitation produced a direct runoff of 5.8 cm. The duration of the rainfall was 16 hrs. Design
- Φ
- Index.

Time from start(h)	0	2	4	6	8	10	12	14	16
Cum. Rainfall(cm)	0	0.4	1.3	2.8	5.1	6.9	8.5	9.5	10

- (b) What is evapo-transpiration? What are the different methods to stop the evaporation from reservoir?

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

- (a) How the method of superposition can be utilized to calculate the mD-hr unit hydrograph from D-hr Unit hydrograph. Briefly explain with an appropriate example.
- (b) Draw a neat sketch of flood hydrograph. Briefly explain its component parts.

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

- (a) Route the following hydrograph through a river reach for which
- $K = 12.0$
- h and
- $x = 0.20$
- . At the start of the inflow flood, the outflow discharge is
- $10 \text{ m}^3/\text{s}$
- .

Time, hr	0	6	12	18	24	30	36	42	48
Inflow, m^3/s	10	20	50	60	55	45	35	27	20

- (b) A bridge has an expected life of 30 years and is designed for a flood magnitude of 130 years. Calculate risk involved. What return period have to be adopted if 13% risk is acceptable.

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

- (a) What are different types of saturated formations? Explain with the help of diagrams. Also derive an equation to calculate discharge from a well in case of confined aquifer
- (b) Write short note on any four of the following:
- (i) Aquifer
 - (ii) Perched aquifer
 - (iii) Storativity
 - (iv) Specific retention
 - (v) Equivalent Permeability