

Paper Id: 

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**B.TECH**  
**(SEM V) THEORY EXAMINATION 2022-23**  
**ENGINEERING HYDROLOGY**

**Time: 3 Hours****Total Marks: 100****Note:** Attempt all Sections. If you require any missing data, then choose suitably.**SECTION A****1. Attempt all questions in brief.****2 x 10 = 20**

- (a) Write water budget equation.
- (b) Define actual evapotranspiration.
- (c) Write 2 basic assumptions of unit hydrograph.
- (d) What is mass curve?
- (e) Write down the Ryves formula of flood estimation.
- (f) Define attenuation.
- (g) Draw diagram to show mutual interference of wells.
- (h) What is perched water table.
- (i) What are different types of contamination in groundwater?
- (j) Define tube well.

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

- (a) What are different forms of precipitation? Also draw a schematic section of tropical cyclone.
- (b) Explain double mass curve of rainfall. Also write the steps to correct the consistency of data.
- (c) Explain risk, reliability and safety factors. Flood frequency computations for a river by using Gumble's method, yielded the following results. Calculate the flood magnitude in the river with the return period of 1000 years.

| Return Period T (Years) | Peak Flood (m <sup>3</sup> /sec) |
|-------------------------|----------------------------------|
| 50                      | 40,809                           |
| 100                     | 46,300                           |

- (d) Derive an equation to calculate discharge from unconfined aquifer for steady state conditions.
- (e) Write the applicability of water wells. Mention its advantages and disadvantages.

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

- (a) Explain in detail different types of recording rain gauges.  
The average annual rainfall of 5 rain gauges in a basin 890, 540, 450, 410 and 550
- (b) mm respectively. Calculate the additional gauges required, if it is desired to limit the error to only 15%?

4. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Explain time characteristics of hydrograph.
  - (b) Define Hydrograph and its components in detail with neat sketch. Explain Unit Hydrograph by defining 1-hour, 6-hour and 24- hour unit hydrograph.
5. Attempt any *one* part of the following: 10 x 1 = 10
- (a) A bridge has an expected life of 25 year and is designed for a flood magnitude of return period 100 years. Calculate the following: -
    - (a) What is the risk of this hydrologic design?
    - (b) If a 10% risk is acceptable, what return period will have to be adopted?
  - (b) Analysis of annual flood series of a river yielded a sample mean of  $1000 \text{ m}^3/\text{s}$  and standard deviation of  $500 \text{ m}^3/\text{s}$ . Derive the design flood of a structure on this river to provide 90% assurance that the structure will not fail in next 50 years. Use Gumbles method and assume the sample size to be very large.
6. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Drawdown in observation well is 5m and 10 m and corresponding radius from well is center is 20m and 15 m respectively. Radius of circle of influence for a well is 500 meters. A tube well is 0.65 m in diameter. The unconfined aquifer is of 25 m depth. After drawdown depth of water is 12 m in the well. Permeability of soil is 27.50 m/day. Calculate the discharge from the well.
  - (b) Explain different types of saturated formations.
7. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Differentiate between Open wells and tube wells. Provide its method of construction by analyzing the soil and ground level characteristics.
  - (b) Write the well construction methods in detail. Also Describe the operation and maintenance of water wells.