

M. Tech.-I (Civil-Hydraulic Engineering) (CBCS – 2015 Course) :
SUMMER - 2019
SUBJECT: HYDROLOGY

Day: Thursday
Date: 23/05/2019

Time: 11.00 AM TO 02.00 PM
Max. Marks: 60

S-2019-3372

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Assume suitable data if necessary.

SECTION-I

- Q.1** a) Explain briefly the water Resources available in India. (05)
- b) Explain in briefly depth-area-duration curves relating the precipitation over a basin. (05)

OR

- a) Describe the salient characteristics of precipitation on India. (05)
- b) Following are the data of a storm as recorded in a self recording rain gauge at a station. (05)

Time from beginning of the storm (minutes)	10	20	30	40	50	60	70
Cumulative rainfall (mm)	15	38	45	62	83	90	102

Plot the hyetograph of the storm.

- Q.2** a) State different methods used to estimate infiltration characteristics of soil and explain use of double ring infiltrometer in detail. (05)
- b) The mass curve of rainfall of duration 150 minutes on a catchment is given below. The Φ index of the catchment is 0.6 cm/hr. Calculate the total surface runoff from the catchment due to this storm. (05)

Time from start (min)	0	30	60	90	120	150
Cumulative rainfall (mm)	0	0.9	1.6	2.9	3.8	4.2

OR

- a) What is Φ index? Explain the procedure to compute Φ index of the catchment. (05)
- b) Explain with sketch standard evaporation pan. (05)
- Q.3** a) Explain the factors affecting runoff of the catchment. (05)
- b) What is meant by 75% dependable yield of a catchment? Describe the procedure to estimate the same by using annual runoff volume time series. (05)

OR

- a) Explain auto co-relation analysis used in hydrological analysis. (05)
- b) Explain any one synthetic flow generation model. (05)

P.T.O.

SECTION-II

Q.4 a) What is S-curve? Explain the S-cure method of developing a 6hr UH by using 12 hr UH of the catchment. (05)

b) A 6hr unit hydrograph of a basin is triangular in shape and has a peak of $60\text{m}^3/\text{s}$. The peak occurs at 18 hours from the start and the base length of the unit hydrograph is 54 hours. (05)

Calculate:

- i) Area of the catchment represented by the Unit hydrograph.
- ii) Calculate the equilibrium discharge of the basin.

OR

a) Explain the procedure of preparing a D hr unit hydrograph for a catchment. (05)

b) What is IUH? What are its characteristics? (05)

Q.5 a) What is meant by reservoir routing and channel routing? Explain. (05)

b) Explain the Modified Pul's method of hydrologic storage routing. (05)

OR

a) Explain the following terms. (05)

- | | |
|---------------------------|-----------------------|
| i) Isochrone | iii) Linear reservoir |
| ii) Time of concentration | iv) Linear channel |

b) What is the basic premise in the Muskingum method of flood routing? Describe a procedure of estimating the values of the Muskingum coefficients K and x for a stream reach. (05)

Q.6 a) Explain how yield of an open well determined using recuperation test. (05)

b) During the recuperation test of a 3.5 m diameter open well a recuperation of the depression head from 2.4m to 1.5m was found to take place in 90 minutes. (05)

Determine the

- i) Specific capacity per unit well area
- ii) Yield of the well for a safe drawdown of 2.4m
- iii) What would be the yield from a well of 4.5 m diameter for a drawdown of 2.35m?

OR

a) State and explain different types of aquifer. (05)

b) Explain the effect of interference of wells. (05)

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