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35031

BT-5 / D-19
HYDROLOGY
Paper- CE-305E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt five questions in all, selecting at least one from each unit.*

Unit–I

1. (a) Discuss the major activities in which hydrologic studies are important. 5

   (b) Briefly describe the various forms of precipitation. 5

   (c) Under what situation is the *Isohyetal method* of computing the average precipitation over an area superior to other two methods? The isohyets due to a storm in a catchment are as follows :

Isohyetals (interval) (cm)	Station-12	12-10	10-8.0	8.0-6.0	6.0-4.0
Inter-isohyetal area (km^2)	30	140	80	180	20

   Estimate the mean depth of precipitation over the catchment due to the storm. 10

2. (a) What are the different points to be considered in selecting the site for a raingauge station? 5

   (b) Explain the *maximum depth-area-duration* relationship relating to the precipitation over a basin. 5

   (c) With the help of sketches, explain the various types of rain gauges. 10

Unit–II

3. (a) Briefly explain Transpiration, Evapotranspiration, Potential Evapotranspiration. 5

   (b) Enumerate various methods of controlling evaporation from water bodies. 5

   (c) Enumerate and write various infiltration equations. Explain the procedure for fitting Horton's equation for experimental data from a given plot. 10

4. (a) What are infiltrometers? Explain the flooding type infiltrometer. 5

   (b) Distinguish between the following :

   (i) Infiltration rate and Infiltration capacity

   (ii) Actual and Potential Evapotranspiration 5

   (c) An isolated storm in a catchment produced a runoff of 3.5 cm. The mass curve of the average rainfall depth over the catchment was as follows :

Time from beginning of the storm (h)	0	1	2	3	4	5	6
Accumulated average rainfall (cm)	0	0.50	1.65	3.55	5.65	6.80	7.75

   Calculate the Φ -index for the storm. 10

Unit–III

5. (a) What are the methods for estimating the runoff volume of a catchment? Explain clearly the rainfall-runoff correlation method. 5

(b) With the aid of typical annual hydrographs describe the salient features of

(i) Perennial

(ii) Intermittent

(iii) Ephemeral streams 10

(c) Enumerate and discuss the different methods of estimation of discharge in a river? 5

6. (a) What do you understand by flood? Explain the flood frequency methods to determine the magnitude of an N-year flood. 10

(b) Given the ordinates of a 4-h unit hydrograph as below, derive the ordinates of a 12-h unit hydrograph for the same catchment.

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates of 4-h UH	0	20	80	130	150	130	90	52	27	15	5	0

Calculate the one-hour unit hydrograph. 10

Unit–IV

5. (a) Write short notes on :

(i) Types of water bearing geological formations

(ii) Water table and piezometric surface

(iii) Darcy's law for measuring velocity of ground water

(iv) Permeability and transmissibility and their relationship 10

(b) Develop an equation relating the steady state discharge from a well in an unconfined aquifer and depths of water table at two known positions from the well. State clearly the assumptions involved in the derivation. 10

8. (a) What do you understand by transmissibility of a confined aquifer? What are the methods of determination of permeability of an aquifer? Explain any one laboratory method of determination of permeability. 10

(b) A confined aquifer is 25 m thick and 2 km wide. Two observation wells located 2 km apart in the direction of flow indicate heads of 45 and 39.50 m. If the coefficient of permeability of the aquifer is 30m/day, calculate

(i) the total daily flow through the aquifer, and

(ii) the piezometric head at the observation well located 300 m from the upstream well. 10