

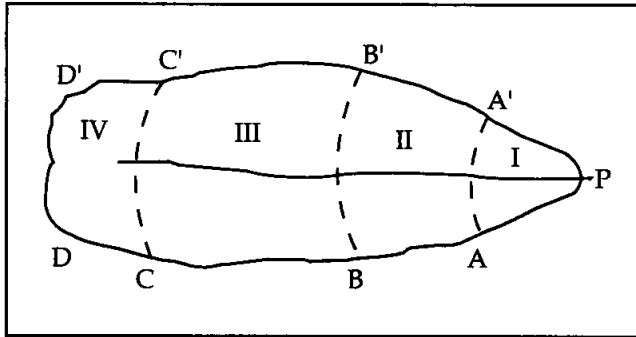
B.Tech. Civil (Water Resources Engineering)**Term-End Examination****June, 2019****ET-532(A) : HYDROLOGY***Time : 3 hours**Maximum Marks : 70**Note : Answer any five questions.*

- 00602
1. (a) Describe various factors affecting evaporation from water bodies and soils. 10
 - (b) What is evapotranspiration, list the factors affecting it? 4
 2. (a) What do you understand by precipitable water? Explain as to how would you estimate it for an area. What is the importance of atmospheric pressure records? 2+6+2=10
 - (b) Derive the relationship between rate of depression storage to the rate of rainfall and rate of infiltration. 4
 3. (a) Thiessen polygons constructed for a network of 10 rain gauges in a river basin yielded Thiessen weights of 0.10, 0.16, 0.12, 0.11, 0.09, 0.08, 0.07, 0.11, 0.06 and 0.10. If the rainfalls recorded at these gauges during a cyclonic storm are 132, 114, 162, 138, 207, 156, 135, 158, 168 and 150 mm. respectively. Determine the average depth of rainfall by Thiessen mean and arithmetic mean methods. Also determine the volume of surface run off at the basin outlet if 35% of the rainfall is lost as infiltration. Take the area of the basin as 5800 km² and express your answer in million cubic meter. 7

- (b) The analysis of a storm yielded the following information regarding isohyets. Calculate the average depth of rainfall. 7

ISOHYET INTERVAL in (mm)	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130
Area in (km)	10	85	113	98	136	67

4. (a) How will you estimate missing precipitation data at a given rain gauge station? What is the usefulness of various methods of computing the average depth of rainfall over a given area? 7
- (b) Derive an expression for steady flow in a unconfined aquifer. 7
5. (a) A catchment area may be divided into four zones based on the isochrones of time of concentration as shown in fig. The times of concentration for the lines AA', BB', CC' and DD' are 1, 2, 3 and 4 hours respectively with reference to the point of observation P. The subareas are 20 ha, 30 ha, 50 ha, and 40 ha for Zones I, II, III and IV. A four hour rainfall is observed on a day having an average intensity of 20 mm per hour over the whole catchment. The run off coefficient 'C' for the first, second, third and fourth hours are 0.5, 0.6, 0.7 and 0.8 for the catchment as a whole. Estimate the hourly discharges (m^3/s) at P due to this rain for the next ten hours since the rain started. 10



- (b) Define infiltration capacity and draw the typical variation of infiltration capacity of soil. 4
6. Write short notes on any four of the following : 4x3½=14
- (a) Flood control in India
 - (b) Flood routing
 - (c) Frequency analysis
 - (d) Probability distribution
 - (e) Catchment models
7. (a) Derive the formula used in Muskingum method of channel routing. 10
- (b) What are the basic assumptions made in derivation of steady flow equation for aquifers ? 4

- o o o -