(Please write your Exam Roll No.) Exam Roll No. 1202560341 5

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCE-307 Subject: Engineering Hydrology

Time: 3 Hours Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Select one question from each Unit. Graph sheets may be used, if required.

Q1 Attempt **any five** question: **(10x2.5=25)**

(a) Explain with neat sketch about Hydrologic cycle? What is potential evapotranspiration?

(b) What are the various losses which occur in the precipitation to become runoff? What are the factors affecting the seasonal and annual yield (annual run off) of a catchments.

(c) What is watershed simulation?

(d) What are the limitations of flood frequency studies?

(e) What are the factors affecting the runoff coefficient C in rational formula.

(f) What are the geological formations in India which have potential as aquifers?

(g) Distinguish between specific capacity of a well and specific yield of an aquifer.

Unit-I

Q2 (a) Explain the procedure for plotting the depth-area-duration curves. What are their uses? Also plot the depth-area-duration curves for 12 hour duration for the following data for estimation of average rainfall depth. **(8.5)**

Isohyets (mm)	300	250	200	150	100	Less than 100
Area enclosed (km²)	450	780	1250	1630	1800	1850

(b) Explain with neat sketches different methods for the estimation of average rainfall depth over an area. **(4)**

Q3 (a) Differentiate between consumptive used and evapotranspriation. Briefly explain the methods of estimation of evapotranspiration? **(5)**

(b) What are the factors affecting infiltration rate? For the storm of 3-hr duration, the rainfall rates are as follows:

Time period (minutes)	30	30	30	30	30	30
Rainfall rate (cm/hr)	1.4	3.4	4.8	3.2	2.0	1.2

If the surface runoff is 3.4 cm. Draw the graph and determine the Φ-index and W-index. **(7.5)**

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Unit-II

Q4 (a) Explain the salient features of a current meter. Describe briefly the procedure of using a current meter for measuring velocity in a stream. **(5)**

(b) The following data were collected at a gauging station on a stream. Compute the discharge by the mid section method. **(7.5)**

Distance from one bank (m)	0	3	6	9	12	15	18	21	24	27
Water depth(m)	0	1.5	3.2	5.0	9.0	5.5	4.0	1.6	1.4	0
Mean velocity (m/s)	0	0.12	0.24	0.25	0.26	0.24	0.23	0.16	0.14	0

Q5 (a) With the aid of neat sketches, describe a flow mass curve, its limitations and explain how it could be used for determination of **(12.5)**

(i) The minimum storage needed to meet a constant demand.

(ii) The maximum constant maintainable demand from a given storage.

Unit-III

Q6 (a) What are the factors affecting a flood hydrograph? **(4.5)**

(b) The flood hydrograph of a small stream is given below. Analyse the recession limb of the hydrograph and determine the recession coefficients and estimate the groundwater storage at the end of 7th day from the occurrence of peak. **(8)**

Time (days)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0
Discharge (m^3/s)	155	70.0	38.0	19.0	9.0	5.5	3.5	2.5	1.9	1.4	1.2	1.1

Q7 (a) What is meant by synthetic Unit Hydrograph? Explain the procedure of Synder's Synthetic-Unit Hydrograph. **(5)**

(b) Two catchment A and B are considered meteorologically similar. Their catchment characteristics are given: Catchment A: L = 30km, L_{ca} = 15km, A = 250 km^2 & For catchment B: L = 45km, Lca = 25km, A = 400km^2. For catchment A, a 2-hour unit hydrograph was developed and was found to have a peak discharge of 50 m^3/s. The time to peak from the beginning of the rainfall excess in this unit hydrograph was 9.0h. Using Synder's method, develop a unit hydrograph for catchment B. **(7.5)**

Unit-IV

Q8 (a) What do you understand by time of concentration of a catchment? Describe briefly methods of estimation of the time of concentration. **(6)**

(b) The mean annual flood of a river is 600 m^3/s and the standard deviation of the annual flood series is 150m^3/s. What is the probability of a flood of magnitude 1000m^3/s occurring in the river within next 5 years? Use Gumbel's method and assume the sample size to be very large. **(6.5)**

Q9 (a) Develop the equation relating the steady-state discharge from a well in an unconfined aquifer and depth of water table at two known position from the well. State clearly all the assumptions involved in you deviation. **(6.5)**

(b) What are the commonly used methods to assess the recharge of ground water in an area? Explain briefly any one method. **(6)**

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