[Please write your Exam Roll No.]   *Exam Roll No.*

END TERM EXAMINATION
FIFTH SEMESTER [B. TECH.] NOVEMBER-DECEMBER 2018

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.

Q1   Answer **any five** questions providing sketches wherever applicable:(5x5=25)
   (a) Explain applications of hydrology in engineering
   (b) Explain hydrograph along with its components
   (c) Draw and explain Horton's representation of hydrological cycle
   (d) Why is separation of base flow required from a flood hydrograph. Describe three methods of base flow separation.
   (e) What is $\varnothing$ Index, W Index, Effective rainfall and Annual average rainfall?
   (f) What are the IS recommendations about density of rain gauges in a catchment area
   (g) Mention flood damage causes and remedial measures.
   (h) Define an aquifer, an aquifer, an aquitard, an aquiclude along with examples.

UNIT-I

Q2   (a) Explain various abstractions from precipitations, along with the various methods to reduce these abstractions.   **(5)**
   (b) A lake had a water surface elevation of 103.200 m above datum at the beginning of a certain month. In that month the lake received an average inflow of 6.0 m³/s. Further, in that month, the lake received a rainfall of 145mm and the evaporation from the lake surface was estimated as 6.10 cm. Write the water-budget equation for the lake and calculate the water surface elevation of the lake at the end of the month. The average lake surface area can be taken as 5000 ha. Assume that there is no contribution to or from ground water storage. **(7.5)**

OR

Q3   (a) Explain various methods to determine areal mean rainfall over an area.   **(5)**
   (b) The following are the rates of the rainfall of the successive 20 min period of a 140 min storm; 2.5, 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr. Taking the value of $\varnothing$ index as 3.2 cm Find out the net runoff in cm, the total rainfall and the value of W-Index? **(7.5)**

UNIT-II

Q4   (a) What is current meter? Explain its types.   **(4)**
   (b) What is stage of a river and explain various stage measurement techniques. https://www.ggsipuonline.com   **(4)**
   (c) A 25 gm/l solution of a fluorescent tracer was discharged into a stream at a constant rate of 10 cm³/sec. The background concentration of the diet in the stream water was found to be zero. At a downstream section sufficiently far away, the die was found to reach an equilibrium concentration of 5 parts per billion. Estimate the stream discharge. **(4.5)**

Q5   (a) Explain electromagnetic and ultrasonic methods for measurement of discharge.   **(5)**

(b) Compute the stream flow for the measurement data given below: **(7.5)**

Distance (m)	0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
Depth (m)	0	0.3	1.29	2.16	2.55	2.22	1.68	1.05	1.05	0.63	0.42	0
Velocity (m/sec) at 0.2 d	0	0.42	0.57	0.78	0.87	0.81	0.75	0.63	0.63	0.54	0.45	0
Velocity (m/sec) at 0.8 d	0	0.2	0.36	0.54	0.60	0.30	0.51	0.39	0.39	0.33	0.30	0
Avg Velocity	0	0.315	0.465	0.66	0.735	0.555	0.645	0.51	0.51	0.435	0.375	0

Solve by area velocity method.

UNIT-III

Q6 (a) Explain all the factors affecting the hydrograph. **(5)**

(b) Given the ordinates of a 4h unit hydrograph as given below. Derive the ordinates of a 12h unit hydrograph for the same catchment. **(7.5)**

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

Q7 (a) Explain synthetic unit hydrograph along with Instantaneous unit hydrograph. **(5)**

(b) A 6h unit hydrograph of a basin is triangular in shape and has a peak of $60 m^3/sec$. The peak Occurs at 18 hours from the start and the base length of the unit hydrograph is 54 hours. **(7.5)**
   i) What is the area of the catchment represented by the Unit hydrograph?
   ii) Calculate the equilibrium discharge of the S_6- curve of the basin.
   iii) Calculate the flood hydrograph due to a rainfall excess of 2.5cm in the first 6hr period and 3.5cm in the next 6h interval. The base flow can be assumed to be $15 m^3/sec$ constant throughout.

UNIT-IV

Q8 (a) What is flood routing? Explain different types of routing and enlist the uses of flood routing. **(5)**

(b) Flood frequency computations for the river Chambal at Gandhisagar dam by using Gumbel's Method, yielding the following results. **(7.5)**

Return Period T (years)	Peak Flood (m³/sce)
50	40,309
100	46,300

Estimate the flood magnitude in this river with a return period of 500 years. https://www.ggsipuonline.com

Q9 (a) Explain the following terms: **(6)**
   i) Design flood.
   ii) Standard design flood.
   iii) Maximum probable flood.
   iv) Design storm.

(b) A 10cm diameter well penetrates a 10 m thick confined aquifer. The steady state Drawdowns were found to be 2.5 m and 0.05m at distances of 10m and 40m respectively from the centre of the wall when the well was pumped at a constant rate of 125 l/min. Calculate the transmissibility and hydraulic conductivity of the aquifer. **(6.5)**

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