00961

B.Tech. Civil (Water Resources Engineering)
Term-End Examination
December, 2015

ET-532(A) : HYDROLOGY

Time : 3 hours　　　　　　　　*Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Give neat and labelled sketches. Assume any missing data suitably.*

1. (a) Explain each part of hydrologic cycle with the help of a suitable sketch. Name the processes forming hydrologic cycle. What is the importance of atmospheric pressure record ?　　7

    (b) How will you estimate missing precipitation data at a given rain-gauge station ? What is double-mass curve analysis ? What is the importance of computing the average depth of rainfall over a given area ?　　7

2. (a) Distinguish between the terms potential evapotranspiration and the actual evapotranspiration. Explain the relation between the two.　　4

    (b) What is the importance of infiltration in hydrologic cycle ? Explain the typical shape of an infiltration capacity curve. Discuss the practical importance of ϕ-index.　　10

3. (a) For a catchment in Uttar Pradesh, the mean monthly rainfall and temperature are given below. Calculate the annual runoff coefficient by Khosla's formulae : 7

Month	T (°C)	Rainfall (cm)
1	12	4
2	16	4
3	21	2
4	27	0
5	31	2
6	34	12
7	31	32
8	29	29
9	28	16
10	29	2
11	19	1
12	14	2

(b) List a few objects which may be used as Floats for the measurement of velocity in a stream.

The velocity of a float in a stream was observed to be 3·0 m/s. Compute the average flow velocity corresponding to this observation. Adopt a reasonable value of the required coefficient and explain why this coefficient is required. 7

4. (a) Define Unit Hydrograph. What are the basic assumptions made in the theory of Unit Hydrograph ? Explain the concept of Synthetic Unit Hydrograph. 7

(b) How are the statistical and probabilistic methods of analytical approach useful in hydrology ? Explain in brief with suitable examples. 7

5. (a) Explain the chi-square test of goodness of fit. 7

(b) For a hydraulic structure with a design life of 100 years, what will be the risk involved if it is designed for 7

(i) 50-year return period flood

(ii) 1000-year return period flood

6. (a) Define a hydrograph. Differentiate between inflow and outflow hydrographs. What do you mean by flood routing ? 7

(b) A 0·3 m diameter well penetrates fully into an unconfined aquifer. The original head before pumping was 25 m. Draw-down readings in two observation wells situated 30 and 80 m away from the main well were recorded to be 6·75 and 6·25 m respectively. Assuming a steady flow and k = 50 m/day, compute the discharge of the main well. 7

7. (a) Explain the following terms : *8*

   (i) Design flood

   (ii) Design storm

   (iii) Design – Flood hydrograph

   (iv) Storm-runoff

   (b) What is flood forecasting and how is it useful *6*

   (i) in reservoir operation ?

   (ii) for municipal administration ?

8. Write short notes on any *four* of the following :

$$4\times3\frac{1}{2}=14$$

   (a) Metrological, Agricultural, Hydrological and Socio-economic Drought

   (b) Drought Indices

   (c) Flow - Duration curves

   (d) The Extent of Drought Prone Areas in India

   (e) Infiltrometers

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