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ET-532(A)

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00748

June, 2016

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 the term hydrologic cycle with a suitable sketch and describe various processes responsible for it. Draw a block diagram representing the complete hydrologic system. 7

(b) Describe the Thiessen polygon and Isohyetal methods for estimating the average depth of precipitation over a catchment. 7

2. (a) Explain the process of evaporation and evapotranspiration. What are the factors affecting these processes ? How will you estimate evaporation loss from a lake ? 7

(b) Explain different indices for estimating excess rainfall. 7

3. (a) State the relationship between rainfall and run-off. Discuss the factors that affect the run-off. How will you calculate the storm run-off, snow-melt and seasonal run-off ? Explain in brief. 7

(b) What is the main difficulty in using the slope-area method of discharge measurement ? In a rectangular channel, 15 m wide, depth of flow is 3·5 m and area of cross-section is 52·5 m^2 at one section and 3·1 m and 51·0 m^2 respectively at the other section 250 m apart. The drop in the water surface elevation was found to be 0·11 m. If Manning's coefficient is 0·015, estimate the discharge through the channel. 7

4. (a) Define Unit Hydrograph and describe its basic theory. How can you show that the unit hydrograph represents a deterministic model of a watershed ? 7

(b) What is the probability that a 5-year flood will

(i) occur four times in a 10-year period ?

(ii) not occur at all in a 10-year period ? 7

5. (a) What are the basic assumptions made in the frequency analysis ? Explain the characteristics of the data required for such type of analysis. 7

(b) While designing any hydraulic structure,

(i) what is the need of risk analysis ?

(ii) what should be the return period ? 7

6. (a) List and discuss various techniques available to route the flood waves through open channels and reservoirs. 7

(b) In an area of 100 hectare, it is observed that water table drops by 5 m. Taking the porosity of the aquifer as 0·3, and the specific retention as 0·1, find the specific yield and change in storage in hectare-metres. 7

7. (a) State the design requirements of an engineering hydraulic structure for flood mitigation. 7

(b) State the relationship between flood forecasting and methods of hydrologic analysis. Outline the procedure to forecast floods. 7

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

$4 \times 3\frac{1}{2} = 14$

(a) Drought Indices

(b) Low Flow Analysis

(c) Ground Water Deficit

(d) Acidity

(e) Infiltration Curve