ET-532(A)

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2007

ET-532(A) : HYDROLOGY

Time : 3 hours *Maximum Marks : 70*

Note : *Solve any **five** questions, all questions carrying equal marks. Neat amd labelled sketches should be freely given. Use of calculators is allowed.*

1. (a) Give a neat, labelled, diagrammatic representation of the typical structure of our atmosphere from troposphere upwards, and give temperature variations in each layer. Explain the reasons for the existence of various layers and the corresponding temperature variations. 7

(b) Discuss the formation of precipitation due to the interaction of various air-fronts. 7

2. (a) A rain gauge station X was inoperative for a part of a certain month during which a storm occurred in the area. However, the storm rainfall recorded in the three surrounding stations ①, ② and ③ gave the values 6·5, 4·7 and 7·0 cm, respectively. If the average annual rainfall for stations ①, ②, ③, and X are 70, 79, 65, and 85 cm, respectively, estimate the average storm rainfall (that occurred) at X. *5*

(b) Explain how the various factors affect evaporation from water bodies, and also from soils. *9*

3. (a) What is evapotranspiration, and how do the relevant parameters influence it ? *4*

(b) For an area (latitude 15° N), the mean monthly temperatures are given as :

Month	June	July	Aug.	Sep.	Oct.
Temp. (°C)	29·5	32·0	30·0	28·0	27·0

Calculate the seasonal consumptive use of water for a wheat crop during a period from 15th June to 15th Oct. Assume K = 1·10.

P_h for 15° N latitude may be assumed as :

June — 8·8; July — 9·05; August — 8·83;
Sep. — 8·28; and Oct. — 8·26 *10*

4. (a) What are Barlow's Table ? Discuss. *4*

(b) Explain the construction and use of Flow Duration curves (both regulated and unregulated). *10*

5. Outline in detail the slope-area method of measurement of discharge in a given stream. In what situations is this procedure most suitable ? *12+2=14*

6. (a) The mean, standard deviation, and coefficient of skewness of an original and log-transformed annual maximum peak flood series of a typical gauging site are given as under :

Parameter	Original Series	Log-transformed series
Mean (m^3/s)	601·00	7·5
Standard deviation (m^3/s)	230·10	0·520
Coefficient of Skewness	1·820	0·737

Estimate the 1000-yr flood assuming that the peak discharge data follow log-normal distribution. Areas under the Standard Normal Density (from 0 to Z) are sampled (for use) as under : *9*

Z	0	1	2	3	4	5	6	7	8	9
0·0	-	-	-	-	-	-	-	-	-	-
0·1	-	-	-	-	-	-	-	-	-	-
3·0	0·4986	-	-	-	-	-	-	-	-	-
3·1	0·4990	-	-	-	-	-	-	-	-	-
3·2	0·4993	-	-	-	-	-	-	-	-	-

(b) Discuss how one can deal with the problem of broken record, incomplete record, and zero-flood years record in a given hydrologic data. 5

7. Write short notes on any ***two*** of the following : 5+5+4=14

(i) Estimation of frequency factor (K_T) in a hydrologic data

(ii) Regional Flood Frequency analysis

(iii) Co-efficient of Skewness