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ET-532(A)

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00970

June, 2014

ET-532(A) : HYDROLOGY

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***five*** *questions. All questions carry equal marks. Give neat and well-labelled sketches where necessary.*

1. (a) Derive an expression to estimate the total water mass available in a given column of air, in terms of hydrostatic and vapour pressure. *8*

(b) With the symbols carrying the usual meanings, prove :

$$p = \left[\rho_d + \rho_w \frac{x}{0{\cdot}622}\right] R_d \times T. \qquad 6$$

2. (a) With the help of a sketch show, as well as explain what is meant by thermopause, and mesosphere. *6*

(b) Discuss through essential details : *8*

(i) Sublimation

(ii) Absorption and Reflection of solar radiation

(iii) Atmospheric Circulation

(iv) Monsoons

3. (a) Give a typical flow duration curve of a stream, and bring out the significance of the following with respect to its shape : *6*

(i) Regulation of the flow of the stream

(ii) Slope of the curve

(iii) Chronological sequence of the occurrence of flow.

(b) A stream is gauged for the period of a small flood occurring : *8*

Distance from right bank (m)	0	3·0	4·0	5·0	6
Depth of flow (m)	0	3·2	3·6	2·8	0
No. of revolutions made (current meter) at 0·6 m below W.S.	0	72	87	69	0
Duration of observation (sec)	0	120	120	120	0

Taking the velocity of flow = [0·5 × No. of revolutions per sec + 0·1], m/s, calculate the discharge in the stream.

4. Vis-à-vis building a stage-discharge relationship at a location, discuss the following; *14*

(i) Loop rating curve

(ii) Conveyance method

(iii) Logarithmic plot method

5. (a) Find the median of the following discharges (m^3/s) : *4*

(i) 13, 7, 8, 15, 4, 9

(ii) 32, 16, 24, 19, 20, 22

(b) Following are the values of annual mean flow (m^3/s) for a river :

75, 77, 96, 52, 35, 101, 72, 65, 82, 78, 32.

Determine the sample statistics for the measure of location. *6*

(c) What do you understand by various measures of symmetry of a given data ? Explain. *4*

6. Explain the following, with respect to a given data : *14*

(i) Student t-Distribution

(ii) Coefficient of determination

(iii) Confidence intervals on regression coefficients

(iv) Significance of overall regression

7. (a) Derive discharge equation (through a well) for a steady flow in an unconfined aquifer. 7

(b) Explain what is meant by a steady flow in a confined aquifer with a sloping, plane piezometric surface. 7

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(i) Runoff coefficient

(ii) Ryves formula

(iii) Creager's equation for estimating flood

(iv) Log-Pearson Type III distribution

(v) Design Storm