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Seat No.	

Total No. of Pages : 3

T.E. (Civil) (Part-I) Examination, 2013
WATER RESOURCES ENGINEERING-I
Sub. Code : 45538

Day and Date : Saturday, 08-06-2013 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific non programmable calculator is allowed.**
4) **Make suitable assumptions regarding data if necessary.**
5) **Draw neat sketches wherever required.**

SECTION-I

Q1) a) Hydrology is a highly interdisciplinary science. Justify. **[4]**

b) Describe the salient characteristics of precipitation on India. **[6]**

c) Explain the procedure for checking the rainfall data for consistency at a particular rain gauge station. **[8]**

Q2) a) A catchment area has seven rain gauge stations. In a year the annual precipitation recorded by the gauges are as follows:

Station	P	Q	R	S	T	U	V
Precipitation (cm)	130.00	142.10	118.20	108.50	165.20	102.10	146.90

For a 5% error in the estimation of mean rainfall, calculate the minimum number of additional stations required to be established in the catchment. **[8]**

b) Explain the different methods of estimating average rainfall over a catchment. **[8]**

Q3) a) Describe with a neat sketch US Weather bureau Class A Land Pan and its use in measuring the evaporation. **[6]**

b) A class A Land Pan was set up adjacent to a lake. The depth of water in the pan at the beginning of a certain week was 195 mm. In that week there was a rainfall of 45 mm and 15 mm of water was removed from the pan to keep the water level within the specified depth range. If the depth

of water in the pan at the end of the week was 190 mm, calculate the pan evaporation. Assuming a pan coefficient value of 0.7, estimate the lake evaporation in that week. [5]

c) Explain how will plot the infiltration capacity vs. time curve using a simple ring infiltrometer. [5]

Q4) a) Define the unit hydrograph. For a particular catchment three storm hydrographs corresponding to rainfall durations of 2.8, 3.0, and 3.2 hours are available. Explain how will you prepare unit hydrograph of 3-h duration for this catchment. [6]

b) The data pertaining to a stream gauging operation at a gauging station are given below. The rating equation of the current meter is $v = 0.51\ N_s + 0.03$ m/s, where, N_s = revolutions per second. Calculate the discharge in the stream. [10]

Distance from left water edge (m)	0	1.0	3.0	5.0	7.0	9.30	11.0	12.0
Depth	0	1.1	2.0	2.5	2.0	1.7	1.0	0
Revolutions of a current meter kept at 0.6 depth	0	39	58	12	90	45	30	0
Duration of observation (sec.)	0	100	100	150	150	100	100	0

Q5) Write short notes on any four of following: [16]

a) Symon's Rain gauge - construction and use.
b) Tropical cyclones-origins and characteristics.
c) Infiltration Indices.
d) Surface floats used for measurement of velocity in river.
e) Dilution technique of stream flow measurement.

SECTION-II

Q6) a) Derive an expression for discharge from a well penetrating a confined aquifer. [8]

b) Distinguish between: [8]

i) Specific capacity of a well & specific yield of an aquifer.

ii) Aquifer & aquiclude.

iii) Confined & unconfined aquifer.

iv) Open wells & tube wells.

Q7) a) Discuss in brief the benefits & ill-effects of irrigation. [8]

b) Explain with a neat sketch working of a Bandhara irrigation scheme. [8]

Q8) a) Enumerate the different methods of applying water to crops. Explain any one in detail. [8]

b) The base period, intensity of irrigation & duty of various crops under a canal system are given in the table below. Find the reservoir capacity if the canal losses are 20% & reservoir losses are 12%. [10]

Crop	Base period (days)	Duty at the field (ha/cumec)	Area under the crop (ha)
Wheat	120	1800	4800
Sugarcane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetables	120	700	1400

Q9) a) What do you understand by 'evapo-transpiration'? Explain how is it determined? Explain any one method. [8]

b) Explain the term watershed management. Explain different aspects of a watershed management programme. [8]

Q10) Write notes on any four of the following: [16]

i) Lift irrigation.

ii) Duty & Delta.

iii) Percolation tanks.

iv) Rain water harvesting.

v) Assessment of irrigation water.

vi) Crop seasons in Maharashtra.

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