Paper Code: ECE 702	Roll No.									

B.Tech.-CIVIL ENGINEERING
(VII) SEMESTER EXAMINATION, 2015-16
WATER RESOURCES ENGINEERING

Time: 3 hrs.] **[Max. Marks: 100]**

Note: ***Attempt All Questions. All Questions carry equal marks*:-**

Q1 Attempt any **TWO** parts of the following. **(10x2=20)**

(a) What is meant by Probable Maximum Precipitation (PMP). For a drainage basin of 600 km^2, isohyetals drawn for a storm gave the following data:

Isohyetals intervals, cm	15 – 12	12 – 9	9 – 6	6 – 3	3 – 1
Inter-isohyetal area, km^2	92	128	120	175	85

Estimate the average depth of precipitation over the above catchment.

(b)Describe the factors affecting evapo-transpiration process. A class - A 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 the water in the pan at the end of the week was 190 mm, calculate the pan evaporation. Using a suitable pan coefficient, estimate the lake evaporation in that week.

(c) Explain clearly the two infiltration indices, Φ-Index and W-Index and their utility in hydrological assessments.

Q2 Attempt any **TWO** parts of the following. **(10x2=20)**

(a) List out all the factors affecting the seasonal and annual yield (annual runoff) of a catchment.Also describe with the aid of neat sketches the salient features of (i) Perennial, (ii) Intermittent and (iii) Ephemeral streams.

(b) Describe any one method of base flow separation from a storm hydrograph. Given below are the observed flows from a storm of 6-h duration on a stream with a catchment area of 500 km^2:

Time, hrs	0	6	12	18	24	30	36	42	48	54	60	66	72
Observed flow, m3/s	0	100	250	200	150	100	70	50	35	25	15	5	0

Assuming the base flow to be zero, derive the ordinates of the 6-h unit hydrograph.

(c) What are various types of Irrigation practices in India? Describe briefly the procedure for estimating the water requirement of a crop.

Q3 Attempt any **TWO** parts of the following. **(10x2=20)**

(a) Determine the bed load transport in a wide alluvial stream for the conditions: Depth of flow = 2.50 m; Velocity of flow = 1.50 m/s; Average slope of water surface = 8×10^{-4}; mean size of sediment = 5.0 mm and specific gravity of the sediment = 2.65.

(b) Describe the Kennedy's method for designing an alluvial channel carrying sediment laden water.

(c) What is water logging? Describe in detail the causes and effects of water logging and measures to prevent it.

Q4 Attempt any **TWO** parts of the following. **(10x2=20)**

(a) Describe in detail various types of irrigation outlets and their selection criteria.

(b) What arevarious objectives and needs of river training works? Describe guide banks as effective river training works.

(c) Describe any two methods of flow measurement in a canal distribution network.

Q5 Attempt any **TWO** parts of the following. **(10x2=20)**

(a) Describe various zones of underground water. Define the terms: Coefficient of Permeability (K) and Specific Storage (S_s).

(b) Derive the expression for the discharge per unit length of a water table aquifer between the two streams having different constant water levels.

(c) A 30 cm diameter well completely penetrates a 25 m thick confined aquifer. Determine the discharge from the well when the draw down at the pumping well is 4.0 m. The coefficient of permeability of the aquifer is 45 m/day. Assume the radius of influence of the well as 350 m.