B.E (FULL TIME) DEGREE END SEMESTER EXAMINATION, APRIL/MAY - 2011

AGRICULTURAL AND IRRIGATION ENGINEERING

IV SEMESTER

AI 9252 – HYDROLOGY AND WATER RESOURCES ENGINEERING

Time: 3 hr **REGULATION 2008** **Marks: 100**

Part – A **10 x 2 = 20**

Answer ALL questions

1. What are all the types of precipitation? Also, state which type is predominant in case of eastern coast, middle and western ghat of Tamil Nadu?
2. Distinguish between depression storage and interception.
3. Define Unit Hydrograph.
4. What factors should be considered in selecting a site for a stream gauging station?
5. What is meant by surcharge storage in a reservoir?
6. Under what circumstance Syphon aqueduct is preferable in a cross drainage work?
7. What is mean by layered heterogeneity and anisotropy formation?
8. What do you understand by the term "First Flush" in roof top Rainwater Harvesting?
9. What are the limitations of flood frequency studies?
10. List the various types of droughts and state its interrelationship with space and time.

Part - B **5 x 16 = 80**

11. (i) Three piezometers located 1000 m apart; bottoms are in the same horizontal aquifer. Piezometer A is due south of piezometer B and Piezometer C is to the east of the line AB. The surface elevations of A, B and C are 95, 110 and 135 m respectively. The depth to water in A is 5 m, in B is 30 m and in C is 35 m, determine the direction of ground water flow through the triangle ABC and calculate the hydraulic gradient. **(6)**

    (ii) Elaborate the importance of rainwater harvesting and explain the different techniques used in urban areas with sketches. **(10)**

12. (a) (i) The normal annual precipitation of five raingauge stations P, Q, R, S and T are respectively 125, 102, 76, 113, and 137 cm. During a particular storm the precipitation recorded by Stations P, Q, R, R and S are 13.2, 9.2, 6.8 and 10.2 cm respectively. The instrument at station T was inoperative during that storm. Estimate the rainfall at station T during that storm. **(6)**

    (ii) How is the double mass curve technique used to check the consistency and adjust the rainfall record at a suspicious station? **(10)**

    (OR)

    (b) (i) A reservoir had an average surface area of 20 km^2 during April 2009. In that month the mean rate of inflow = 10 m^3/s, outflow = 15 m^3/s, monthly rainfall = 10 cm and change in storage = 16 Mm^3. Assuming the seepage losses to be 1.8 cm, estimate the evaporation in that month. **(6)**

(ii) The rate of rainfall for a 2 hour period is given below. If the value of Φ - index is 1.8 cm/hr. Determine (i) Total value of surface runoff (ii) Total rainfall and (iii) w – index. The area of catchment is 14 km^2. **(10)**

Time duration (min)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Rainfall rate (cm/hr)	1.0	1.5	2.5	6.0	10.0	3.0

13. (a) (i) Describe the factors affecting the seasonal and annual runoff of a catchment. **(6)**

(ii) In what ways the discharge measurement of a stream can be made? Explain the various direct methods of stream flow measurement with neat sketches. **(10)**

(OR)

(b) The ordinates of a 6-h unit hydrograph are given.

Time (hrs)	0	6	12	18	24	30
6-h UH ordinate (m^3/s)	0	20	60	150	120	90
Time (hrs)	36	42	48	54	60	66
6-h UH ordinate (m^3/s)	66	50	32	20	10	0

If two storms, each of 1-cm rainfall excess and 6-h duration occur in succession, calculate and plot the resulting hydrograph of flow. Assume base flow to be uniform at $10 m^3/s$. **(16)**

14. (a) (i) Discuss the procedure for fixing the storage capacity of a reservoir by ripple mass curve method. **(8)**

(ii) What are the measures to be adopted for control of sediment inflow into a reservoir? **(8)**

(OR)

(b) (i) Explain the different cross drainage works with neat sketches, stating their functions and advantages. **(8)**

(ii) Write short note on canal types and its alignment. **(8)**

15. (a) Compute the maximum flood discharge at a bridge site from the following data: Assuming Manning's co-efficient n = 0.03. **(16)**

Cross Section Details

Distance from Bench Mark (m)	0	11	24	52	67	79	84
Cross section R.L	10.8	9.6	4.2	2.4	5.4	10.2	10.5

Longitudinal Section Details

Distance from bridge site	1 km U/S	At the site	1 km D/S
H.F.L along Longitudinal section (m)	9.6	9.2	8.8

(OR)

(b) Drought – an integrated approach is needed – why? List the various measures that can be adopted to identify and reduce the effect of drought. **(16)**