

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER-III • EXAMINATION – SUMMER 2013****Subject Code: X30601****Date: 09-05-2013****Subject Name: Hydrology and Water Resources Engineering****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) Define hydrology and explain the importance of hydrology to engineers by discussing its scope 07
- (b) Draw sketches and discuss the hydrological cycle 07
- Q.2 (a) Explain the following: (i) convective precipitation (ii) frontal precipitation 07
- (b) (i) Enlist various methods of measuring rainfall over an area and discuss which method gives the most accurate results. (ii) Given are the annual isohyets for an area find the average annual rainfall over the area for the table given below: 07

Area enclosed between isohyets km ²	220	380	250	200
Isohytes (cm)	25-50	50-75	75-100	100-125

OR

- (b) The table below contains the isohyetal data for a four day storm make calculations to tabulate data for depth area curve for a four day storm: 07

Cumulative Area Enclosed Thousand Km ²	Isohytal Range (cm)	Cumulative Area Enclosed Thousand Km ²	Isohytal Range (cm)
0.5	> 50, say 55	82	25-30
4	40-50	122	20-25
7	35-40	156	20-15
29	30-35	236	15-10

- Q.3 (a) Explain clearly the assumptions made in the unit hydrograph theory and their importance in the development of unit hydrograph for the given catchment. 07
- (b) Given below are the ordinates of 6 hour unit hydrograph at 6 hour interval. Find the hydrograph of a runoff due to two successive storms of 6 hours duration producing 2 cm and 3 cm excess run off respectively: 07

Time (hr)	0	6	12	18	24	30	36	42	48	54	60
Ordinates 6 hr UHG cumecs	0	50	125	185	160	110	60	36	25	16	0

State clearly the assumptions made in making the above derivations

OR

- Q.3 (a) Explain the utility of stage discharge curves and explain stage discharge curves for falling stage and rising stage. 07
- (b) It was observed in a field test on ground water that 3 hour was required for a tracer to travel from one well to another 20 metres apart and the difference in water level elevation was 0.5 metre. The porosity of the aquifer is 15%. Find the permeability of the aquifer and Reynolds number of flow assuming average 07

grain size 2 mm and viscosity of water 0.008 stokes

- Q.4 (a) Explain flood control by (i) construction of flood control reservoir (ii) construction of levees. Explain the interdependence between the two measures. 07
- (b) Explain the difference between infiltration and deep percolation, explain factors affecting infiltration 07

OR

- Q.4 (a) Explain the procedure for sub surface investigation for finding out position of water table by the use of electrical resistivity meter. 07
- (b) Answer the following about ground water movement: 07
- (i) Darcy's law for ground water movement.
- (ii) Mathematical expression for Reynolds number of flow
- (iii) Actual and theoretical area of flow; Actual and theoretical velocity of flow

- Q.5 (a) Explain the utility of the 'S' curve hydrograph and explain how it is obtained by plotting and summing infinite number of 'D' hour unit hydrograph summed at a lag of D hours. 07
- (b) Explain what you understand by reservoir routing stating the inputs to be given and the outputs obtained and the basic hydrologic equations used. 07

OR

- Q.5 (a) Explain the factors affecting reservoir evaporation and explain how the reservoir evaporation can be controlled. 07
- (b) Explain the measurement of soil infiltration by double ring infiltrometer stating the governing equations and explain the terms contained in the governing equation. 07
