Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–III • EXAMINATION – WINTER 2013

Subject Code: X30601 **Date: 18-12-2013**

Subject Name: Hydrology and Water Resources Engineering

Time: 10.30 am - 01.00 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)** (i) Give the scope of hydrology. (ii) Give a quantative analysis of world water resources categorizing the available water resources into: fresh and salty water, surface water and ground water, ice caps and lake and stream water **07**

(b) Define the following terms: apparent velocity and actual velocity of ground water; aquifer and aquifuge; permeability,transmissibility and porosity of ground water **07**

Q.2 **(a)** The following data were collected during a stream gauging operation in a river . Compute the discharge. **07**

Distance from left water edge (m)	Depth (m) d	Velocity at 0.6d
0	0.0	0.0
1.5	1.3	0.5
3	2.5	0.75
4.5	1.7	0.6
6	1.0	0.5
7.5	0.4	0.35
9.0	0.0	0

(b) Draw sketches to explain cyclonic and frontal precipitation **07**

OR

(b) Explain double and single ring infiltrometer test. When is double ring infiltrometer test preferred? Draw a curve showing variation of infiltration rate with time. **07**

Q.3 **(a)** Define reservoir routing and channel routing. Explain the data required to be given for channel and reservoir routing and clearly list the outputs obtained. **07**

(b) The following is the observed flow for a 6 hour storm for 6 hour interval : 20, 30, 35 , 47.5 , 45, 42 ,40,35, 32, 30 ,20 cumecs find out the volume of run off obtained in cm. Take the basin area as 325 square kilometer. Find the coordinates of a 6 hour unit hydrograph for the basin **07**

OR

Q.3 **(a)** Explain structural and non structural measures of flood control. Explain in detail the structural measures. **07**

(b) The rate of rainfall for successive 15 minutes interval for a 90 minute rainfall are 3, 8, 6.5 1.9,3.6 and 6cm/hr If $Ø_{index}$ is = 3cm/hr estimate runoff and find the w_{index} **07**

Q.4 **(a)** Define stream gauging and explain the tracer method of stream gauging and its utility **07**

(b) Draw the stage discharge curve for the rising stage, falling stage and the constant stage and explain the correction to be applied for calculation of actual discharge. **07**

OR

Q.4	**(a)**	Explain the flood frequency analysis for estimation of floods.	**07**
	(b)	Enlist the factors affecting infiltration and the factors affecting run off	**07**
Q.5	**(a)**	Define simulation. Explain calibration, testing and validation of a surface run off model. State the advantage of simulation modeling.	**07**
	(b)	Define evaporation and transpiration. Enlist the methods to estimate evaporation and a suitable method to estimate evaporation over a reservoir.	**07**

OR

Q.5	**(a)**	State and explain the assumptions made in the theory of unit hydrograph and the utility and limitations of theory of unit hydrograph	**07**
	(b)	Explain the concept of ‘S” curve and its utility	**07**

****