GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V • EXAMINATION – WINTER 2016

Subject Code:150602   **Date: 02/12/2016**
Subject Name: Hydrology and Water Resources Engineering
Time: 10:30AM – 01:00PM   **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)**	Explain various zones of storage in a reservoir, with a neat sketch. Also, discuss different measures to reduce reservoir sedimentation.	**07**
	(b)	Explain: Hydrograph. Sketch a single peak flood hydrograph and discuss different elements of flood hydrograph. What are different uses of hydrograph?	**07**
Q.2	**(a)**	Explain the following terms: Infiltration, Evapotranspiration, Rain gauge density. A catchment area has five rain gauge stations. In a year the annual rainfall recorded by the gauges are as follows:	**07**

Station	A	B	C	D	E
Rainfall (cm)	98.8	102.9	82.6	110.3	180.3

Calculate the minimum number of rain-gauge stations required in the catchment, to limit 8% error in the estimation of the mean rainfall.

	(b)	Explain: Unit Hydrograph (UH). What are the assumptions in UH theory?	**07**

OR

	(b)	What are the different methods of flood frequency analysis? Discuss any one of them in detail.	**07**
Q.3	**(a)**	What are the methods of computing average depth of precipitation? Explain any one of them in detail. Compute the average depth of rainfall and volume of rain water using Thiessen polygon method for the data given below:	**07**

Station	1	2	3	4	5	6	7	8
Rainfall (mm)	40	48	38	55	49	37	25	40
Area of Polygon (km^2)	1.5	41.5	47.2	6.6	35.8	49.8	10.4	7.2

	(b)	What are the different factors affecting evaporation? Suggest suitable methods to reduce evaporation from a reservoir.	**07**

OR

Q.3	**(a)**	Explain the following terms, in context of ground water hydrology: Radius of influence, flowing well, aquifuge, aquifer, permeability, confined aquifer, drawdown.	**07**
	(b)	Discuss the objectives of water resources development. Also, explain the environmental aspects in water resources planning.	**07**
Q.4	**(a)**	Explain the term 'Flood routing' and differentiate between 'reservoir routing' and 'channel routing'. How does reservoir routing help in flood management?	**07**
	(b)	Distinguish between artesian well and water table well, using a neat sketch. A 30 cm well fully penetrates a confined aquifer 30 m deep. After a long period pumping at a rate of 1200 lpm, the drawdown in the wells at 20m and 45 m from the pumping well are found to be 2.2 m and 1.8 m respectively. Determine the transmissibility of the aquifer. What is the drawdown in the pumping well?	**07**

Q.4 **(a)** What are different methods for water harvesting? Discuss each one in detail. **07**

(b) What are the different structural and non-structural methods for flood control? Explain any two of them. **07**

Q.5 **(a)** With a neat sketch, show different components of hydroelectric scheme and explain the functions of each of them. **07**

(b) Explain the terms 'attenuation' and 'time lag'. **07**

Route the flood through a channel, using Muskingum method, for the inflow hydrograph given as:

Time (hr)	0	4	8	12	16	20	24
Inflow (cumecs)	42	68	116	164	194	200	192
Time (hr)	32	36	40	44	48	52	56
Inflow (cumecs)	150	128	106	88	74	62	54

Take storage constant (k) and dimensionless constant (x) for the given channel reach as 12 hrs and 0.278 respectively.

OR

Q.5 **(a)** Explain the functional requirements of water resources projects. **07**

(b) Explain mass curve analysis to determine the reservoir capacity required for a given constant demand. **07**

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