Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150602 **Date: 21/05/2016**

Subject Name: Hydrology & Water Resources Engineering

Time: 02:30 PM to 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) Discuss all components of a hydroelectric power plant in brief. Differentiate between low and high head power plants. **07**

(b) What is the need for planning of water resources projects? Discuss the steps involved in the water resources planning. **07**

Q.2 (a) **(i)** Enlist various methods to compute the average annual rainfall over a catchment and explain any one with neat sketch. **04**

(ii) Explain with neat sketch infiltration characteristic curve of any catchment with significant notes. **03**

(b) Explain in detail with neat sketch the double mass curve technique to check the consistency of rainfall data. **07**

OR

(b) A storm with 15 cm precipitation produced a direct runoff of 8.7 cm. The time distribution of storm is as follows. Calculate Φ-index. **07**

Time from start (hr)	1	2	3	4	5	6	7	8
Incremental rainfall in (cm/hr)	0.60	1.35	2.25	3.45	2.70	2.40	1.50	0.75

Q.3 (a) **(i)** A rain gauge 'A' was inoperative during a specific storm. The rainfall recorded at three surrounding stations B, C and D during that storm were 107, 89 and 122 mm respectively. If the average annual rainfall of stations A, B, C and D are 978, 1120, 935 and 1200 mm respectively, estimate the storm precipitation of station A. **07**

(ii) The rainfall values at gauging stations and corresponding areas of Thiessen's polygons for a drainage basin are as follows: Compute the average rainfall over the basin.

Station	A	B	C	D	E
Area of Thiessen's Polygon (km^2)	45	39	32	40	36
Rainfall (cm)	12.5	18.9	15.7	13.4	17.3

(b) What are the factors that affect Evapotranspiration? Describe any one method of measurement of Evapotranspiration **07**

OR

Q.3 (a) With a neat sketch, describe various zones of storage in a reservoir. Also suggest measures to control reservoir sedimentation. **07**

(b) What is meant by 'water harvesting'? Explain methods of roof water harvesting and water harvesting for agricultural use. **07**

Q.4 **(a)** Explain procedure to derive s-curve hydrograph from a given unit hydrograph. What are the uses of s-curve hydrograph? **07**

(b) Discuss occurrence of groundwater with a neat sketch and define various water bearing formations. **07**

OR

Q.4 **(a)** Define Unit Hydrograph. Discuss basic assumptions, applications and limitations of Unit Hydrograph theory. **07**

(b) The ordinates of flood hydrograph from a 4-hr rainfall are given in the following table. Derive ordinates of 4-Hr unit hydrograph for a catchment area of 640 km^2.Take constant base flow of 30 cumec. **07**

Time (hrs)	0	4	8	12	16	20	24	28	32	36	40
Discharge Cm^3/sec	30	68	205	410	330	254	195	133	95	58	30

Q.5 **(a)** Discuss causes of flood. **07**

(b) Explain flood routing through reservoirs. **07**

OR

Q.5 **(a)** Explain draught and causes of draught. **07**

(b) Write short note on Structural methods of flood control with neat sketches. **07**

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