

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2150602

Date: 27/04/2017

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)** **07**
1. Define Hydrology with three key words
 2. State names of hydrological data types
 3. Differentiate Surface and Ground water Hydrology.
 4. What is Evapotranspiration and evaporation?
 5. What is sub surface runoff?
 6. What you mean by aquifer?
 7. What is aquiclude?

- (b)** **07**
1. Does slope decrease or increase the runoff?
 2. Does trees helps in bringing rainfall or not?
 3. What is reflected by inflection point of hydrograph?
 4. What is multipeak hydrograph reflecting?
 5. Does type of soil affect the rate of infiltration or not?
 6. What is storage coefficient of an aquifer?
 7. What is transmissibility of an aquifer?

- Q.2 (a)** **04**
- (i)** Enlist various methods to compute the average annual rainfall over a catchment and explain any one with neat sketch. **03**
- (ii)** Explain with neat sketch infiltration characteristic curve of any catchment with significant notes.

- (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)** **07**
- (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.

(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 km². 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 in brief all structural methods of flood control. **07**

OR

- Q.5** (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**
