

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2150602

Date:06/05/2016

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) Describe non-automatic and automatic rain gauges. Explain the merits and demerits of each. 07
- (b) A thunder storm of 6hour duration produces the following flood hydrograph. 07
Derive the ordinates of unit hydrograph for a catchment area of 2845 km². Also sketch the resulting unit hydrograph.

Date	July 3				July 4				July 5	
Time (hour)	6 am	12 noon	6 pm	12 mid night	6 am	12 noon	6 pm	12 mid night	6 am	12 noon
Discharge (m ³ /sec)	100	400	1500	3500	5100	3000	1500	900	400	100

- Q.2 (a) A recording rain gauge was installed on a basin having catchment area of 35 km². 07
The mass curve of rainfall is recorded during a storm is given below.

Time from start of storm (hours)	0	2	4	6	8	10	12	14
Accumulated rainfall (mm)	0	8	18	59	68	83	89	95

If the volume of measured runoff due to storm is $1.4 \times 10^6 \text{ m}^3$, estimate the ϕ -index of the basin.

- (b) Define the following with figure (1) Earthen dam (2) Gravity dam (3) Arch dam 07
(4) Buttress dam (5) Spillway

OR

- (b) Describe in detail the factors affecting infiltration. 07

- Q.3 (a) Define unit hydrograph and its uses. Clearly explain the assumption made in the derivation of unit hydrograph. 07

- (b) Define the following (1) Aquifer (2) Aquiclude (3) Aquifuge (4) Specific yield (5) Specific retention (6) Storage coefficient (7) Transmissibility coefficient 07

OR

- Q.3 (a) Explain Darcy's law with its limitations. Describe the procedure of proving it experimentally. 07

- (b) Describe in brief (1) Reservoir sedimentation (2) Reservoir capacity 07

- Q.4 (a) Describe the various components of a typical hydropower plant with a neat sketch. 07
Also discuss the function of each component.

- (b) Describe the situations under which the following dams are constructed (1) Gravity dam (2) earthen dam (3) Arch dam. Also describe any two major reservoirs of India. 07

OR

- Q.4 (a) Define flood and its causes. Also discuss various measures taken to control the flood. 07
- (b) (i) Define the following (a) Return period (b) Spillway design flood (c) Probable maximum flood 07
- (ii) A bridge has an expected life of 25 years and designed for flood management of return period 100 years. (a) What is the risk of this hydrologic design (b) if a 10% risk is acceptable, what return period will have to be adopted.
- Q.5 (a) Distinguish between 07
- (1) Hydraulic and hydrologic method of flood routing
- (2) Hydrologic storage routing and hydrologic channel routing
- (3) Prism storage and wedge storage
- (b) Describe the types of drought and its causes. 07
- OR
- Q.5 (a) Describe various measures of water conservation and augmentation. 07
- (b) Describe in brief 07
- (1) Channel improvement (2) Flood damage analysis
