

Enrollment No: _____

Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Water Resources Engineering

Subject Code: 4TE05WRE1

Branch: B.Tech (Civil)

Semester: 5

Date: 21/03/2018

Time: 10:30 To 01:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

- Q-1 Attempt the following questions: (14)**
- a) Define hyetograph. **01**
 - b) Define frequency of rain. **01**
 - c) Define infiltration. **01**
 - d) Define Hydrograph. **01**
 - e) Which types of rain gauges is used for measuring rain in remote hilly inaccessible areas? **01**
 - f) Define Runoff. **01**
 - g) Define time of concentration. **01**
 - h) What is "Chance flood"? **01**
 - i) What is the unit of runoff in M.K.S. system? **01**
 - j) Define shallow well. **01**
 - k) What is Darcy's Law? **01**
 - l) Define groundwater. **01**
 - m) Define aquifers. **01**
 - n) Define delta. **01**

Attempt any four questions from Q-2 to Q-8

- Q-2 Attempt all questions (14)**
- (a) Describe the objectives of watershed management. **05**
 - (b) Discuss variability and time distribution of precipitation. **05**
 - (c) The mean daily flows at a gauging station for a period of 7 days 7, 27, 58, 41, 31, 20 and 13 m³/s respectively. What is the total volume of stream flow at the site in cumec-days and in hectare-metres? What is the mean flow rate for the week? If the drainage area at the site is 100 km². What is the runoff depth in cm? **04**
- Q-3 Attempt all questions (14)**
- (a) Explain factors affecting duty. **05**
 - (b) Describe Recuperation test for open well. **05**
 - (c) Find the delta for a crop, when its duty is 864 hectares/cumec on the field, the base period of this crop is 120 days. **04**
- Q-4 Attempt all questions (14)**
- (a) Write a short note on soil conservation. **05**
 - (b) A river has an average surface width of 20 m. If the evaporation measured in the vicinity of the river is 0.5 m/day, the volume of water evaporated in 60 km stretch of the river in a month of 30 days (in m³) is _____. **05**



- (c) Discuss various factors affecting sedimentation and also discuss about types of sediment load. **04**

Q-5 Attempt all questions (14)

- (a) Derive Dupuit's formula for confined aquifer or pressure well. **07**
- (b) The excess rainfall (direct runoff) produced from a 10.0 cm rainfall of a storm is 6.0 cm. the rainfall at each hour of the storm recorded by a rain gauge is as under. Calculate the infiltration index of the storm. **07**

Time (hr)	1	2	3	4	5	6	7	8
Incremental rainfall (cm)	0.1	1.0	1.4	2.6	2.0	1.5	1.0	0.4

Q-6 Attempt all questions (14)

- (a) Explain procedure to derive S-curve hydrograph from a given unit hydrograph. What are the uses of S-curve hydrograph? **07**
- (b) An isolated 3 hour storm occurred over an area of 120 ha as below: **07**

Partial area of catchment (ha)	ϕ_{index} (cm/hr)	Rainfall (cm)		
		1 st hour	2 nd hour	3 rd hour
36	0.90	0.6	2.4	1.3
18	1.10	0.9	2.1	1.5
66	0.50	1.0	2.0	0.9

What is the total rainfall on the catchment in this storm? Estimate the runoff from the catchment. If the ϕ_{index} were to remain at the same value, what runoff would be produced by a uniform rainfall of 3.3 cm in 3 hours uniformly spread all over the catchment?

Q-7 Attempt all questions (14)

- (a) Estimate the average depth of precipitation, from depth-area curve, that may be expected over an area of 2400 sq. km, due to the storm of 27th September, 1978, lasting for 24 hours, assuming the storm centre to be located at the centre of the area. The isohyetal map for the storm gave the areas enclosed between different isohyets as follows: **07**

Isohyets in mm	21	20	19	18	17	16	15	14	13	12
Enclosed area in sq. km.	543	1345	2030	2545	2955	3280	3535	3710	3880	3915

Hence, determine the depth of rain fall due to the storm that may be expected to be recorded by a rain gauge placed at the storm centre.

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

Q-8 Attempt all questions (14)

- (a) Describe the principle elements of the first National Water Policy (1987). **07**
- (b) Calculate the discharge of a gravity well of diameter 2 m; the normal depth of water and draw-down are 8 m and 5 m respectively. Assume radius of circle of influence as 100 m and permeability constant as 20 m per day. **07**

