

GANPAT UNIVERSITY**B. Tech. Semester: V (CIVIL ENGINEERING)****CBCS Regular Theory Examination – Nov/Dec 2016****2CI 502 HYDROLOGY AND WATER RESOURCES ENGINEERING****Time: 3 Hours****Total Marks: 60****Instructions:**

- (1) This Question paper has two sections. Attempt each section in separate answer book.
- (2) Figures on right indicate marks.
- (3) Be precise and to the point in answering the descriptive questions.
- (4) Assume necessary data if required

Section-I

Q-1(a) Explain the hydraulic cycle in nature with the help of a neat sketch, indicating its various phases. What is the function of hydrology in water resources development? 5

Q-1(b) What is rain gauge? Distinguish between recording and non-recording rain-gauges, giving examples of such gauges used in India. 5

OR

Q-1(a) What are different types of precipitation? Distinguish between the precipitation and rainfall. 5

Q-1(b) The network of 10 stations in and around a river basin has the theissen weight of 0.1, 0.06, 0.11, 0.07, 0.08, 0.09, 0.11, 0.12, 0.16 and 0.1 respectively. If the rainfall recorded at these gauges during a storm are 150, 168, 158, 135, 156, 207, 138, 162, 114, 132 mm respectively. Determine the average depth of rainfall over the basin by [1] Arithmetic mean method [2] Theissen polygon method 5

Q-2(a) Sketch a typical curve of infiltration and give its equation. What are the factors, which affect infiltration? 5

Q-2(b) Define and distinguish the terms 'Evaporation' and 'Evapotranspiration'. How 'Evapotranspiration' from a basin is estimated? 5

OR

Q-2(a) Define the terms 'Infiltration' and Describe any one field method of determining infiltration with a sketch. 5

Q-2(b) Storm of 3 hour occurred over a Catchment area = 8000 ha as shown in a table below:- 5

% Portion of Catchment	Ø index [cm/hr]	Rainfall [cms]		
		1 st Hour	2 nd Hour	3 rd hour
30	0.6	0.70	5.80	2.90
30	0.7	0.80	4.80	1.80
40	0.60	1.10	2.40	0.50

- (1) What is the total rainfall on the catchment?
- (2) What is the total runoff of the catchment?
- (3) What would be runoff by a rainfall of 3 cm in 3 hr uniformly distributed all over the catchment?
- (4) What would be the runoff by a rainfall of 1.5 cms in 3 hrs uniformly distributed all over the catchment

- Q-3** Write a note/Answer *any two* of the followings 10
- (1) Drainage density
 - (2) Influent and Effluent streams
 - (3) Discuss the rational method for computing runoff.

Section-II

- Q-4(a)** What is 'Unit Hydrograph'? State the applications and limitations of a Unit Hydrograph 5
- Q-4(b)** Describe slope area method of measuring stream flow. Under which circumstances this method is applicable 5

OR

- Q-4(a)** Define S-Hydrograph and state its applications. After how many hours the discharge will be stabilized 5
- Q-4(b)** Ordinates of a 4-hr Unit Hydrograph [UGH] of a catchment are given below: 5

Time [hr]	0	4	8	12	16	20	24	28
Ordinates of UGH (cumec)	0	10	20	16	12	8	4	0

Derive a flood hydrograph at the catchment outlet for a storm given below:

Time from start of storm [hr]	0	4	8	12
Accumulated rainfall in [cm]	0	3.9	4.7	7.6

Assume ϕ -index as 0.3 cm/hr and a constant base flow of 10 cumec. Draw a hydrograph.

- Q-5(a)** State the importance of flood studies. Describe the non structural methods of flood control. 5
- Q-5(b)** State the classification of zones of ground water occurrence with neat sketch. Which one is important with respect to agricultural practices? 5

OR

- Q-5(a)** State the different formations in which ground water exists. Which formation is used for extractions of ground water resources and why? 5
- Q-5(b)** A field test for permeability consists in observing the time required for a tracer to travel between two observation wells. A tracer was found to take 10 hour to travel between two wells 50 m apart when the difference in the water surface elevation in them was 0.5m. the mean particle size of the aquifer was 2mm and the porosity of the medium 0.3. if $v = 0.01 \text{ cm}^2/\text{s}$ estimate [1] The coefficient of permeability and intrinsic permeability of the aquifer, and [2] The Reynolds number of flow. 5

- Q-6** Write a note/Answer *any two* of the following:- 10
- (1) Simulation modeling.
 - (2) 'Flood routing' through a channel.
 - (3) Distinguish between confined Aquifer and Unconfined Aquifer.

END OF PAPER