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**Fifth Semester B.E. Degree Examination, June/July 2017**  
**Hydrology and Irrigation Engineering**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting  
atleast TWO questions from each part.  
2. Missing data may suitably be assumed.**

**PART – A**

- 1
  - a. Define Precipitation. Explain various forms of precipitation. (06 Marks)
  - b. Explain with neat sketch Syphon's rain gauge station. (07 Marks)
  - c. The average annual rainfall in cm at four existing raingauge stations in a basin are 105, 79, 70 and 66. If the average depth of rainfall over the basin is to be estimated within 10% error, determine the additional number of gauges required. (07 Marks)
- 2
  - a. Define Evaporation. With neat sketch, explain measurement of evaporation using IS class A pan. (06 Marks)
  - b. What are the various methods of measurement of rate of infiltration? Also explain determination of constants in Horton's equation. (06 Marks)
  - c. The rate of rainfall for successive 30 minutes period of a 4 hour storm are as follows : 3.5, 6.5, 8.5, 7.8, 6.4, 4.0, 4.0, 6.0 cm/hr. Taking the value of  $\phi$  index as 4.5 cm/hr. Compute the following : i) Rainfall total ii) Total rainfall excess and iii) W – index. (08 Marks)
- 3
  - a. Define a Hydrograph. Explain various components of flood hydrograph. (06 Marks)
  - b. Explain step by step derivation of unit hydrograph. (06 Marks)
  - c. Given the ordinates of 4 hr. unit hydrograph, derive the ordinates of 12 hr unit hydrograph for same catchment. (08 Marks)

Time (hrs)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4 hr unit hydrograph	0	20	80	130	150	130	90	52	27	15	5	0

- 4
  - a. Define Flood routing. What are the uses of flood routing? (06 Marks)
  - b. Differentiate between : i) Hydraulic routing and hydrologic routing ii) Channel routing and reservoir routing iii) Prism storage and Wedge storage. (06 Marks)
  - c. Derive Muskingum routing equation and expressions for routing co-efficients  $C_0$ ,  $C_1$  and  $C_2$ . (08 Marks)

**PART – B**

- 5
  - a. Differentiate between : i) Agriculture and Irrigation ii) Sewage irrigation and supplemental irrigation iii) Explain Well irrigation method. (08 Marks)
  - b. Explain Environmental impacts of irrigation. (06 Marks)
  - c. Explain advantages and disadvantages of irrigation. (06 Marks)
- 6
  - a. Explain classification of soils. (06 Marks)
  - b. What is Frequency of irrigation? How depth of water stored in root zone is derived? (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



- c. After how many days will you supply water to (clay loam) in order to ensure efficient irrigation of given crop, if  
i) Field capacity of soil = 27%    ii) Permanent wilting point = 14%    iii) Density of soil = 1.5 gm/cc    iv) Effective depth of root zone = 75cm    v) Daily consumptive use of water for given crop = 11mm. (08 Marks)
- 7 a. Define Duty, Delta and Base period. Establish a relationship between them. (06 Marks)  
b. What is Consumptive use of water? What are the factors affecting consumptive use of water? (08 Marks)  
c. The base period, intensity of irrigation and duty of various crops under canal system are given in table below. Find the reservoir capacity, if the canal losses are 20% and reservoir losses are 12%. (06 Marks)

Crop	Base period in days	Duty at field (ha/cumecs) D	Area under crop (ha)
Wheat	120	1800	4800
Sugarcane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetables	120	700	1400

- 8 a. What are the Canals? Explain classification of canals. (06 Marks)  
b. Explain Lacey's regime theory. (08 Marks)  
c. Design an irrigation channel to carry a discharge of 14 cumecs. Assume  
 $N = 0.0225$ ,  $m = 1$   $\frac{B}{D} = 5.7$  (06 Marks)

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