Hall Ticket No | | | | | | | | | | | Question Paper Code: ACE014

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech VI Semester End Examinations (Regular) - May, 2019

Regulation: IARE – R16

WATER RESOURCE ENGINEERING

Time: 3 Hours **(CE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Describe practical applications of hydrology and discuss the various forms of precipitation in detail. **[7M]**

   (b) List infiltration indices and the total runoff volume during a 6h storm with a uniform intensity of 1.5 cm/h is 21.6x10^6 m^3. If the area of the basin is 300 km^2, find the average infiltration rate for the basin. **[7M]**

2. (a) Describe the various empirical equations used to estimate evaporation. **[7M]**

   (b) The isohyets drawn for a storm which occurred over a drainage basin of area 950 sq.km yielded the following information in Table 1. Determine the average depth of rainfall over the basin. **[7M]**

Table 1

Isohyetal interval in (mm)	85-75	75-65	65-55	55-45	45-35
Area between isohyets (sq.km)	125	236	264	175	150

UNIT – II

3. (a) Define unit Hydrograph. Explain the assumptions underlying the unit Hydrograph theory and explain its limitations. **[7M]**

   (b) A 3 hr storm produced a flood hydrograph as given in Table 2. **[7M]**

Table 2

Time (hr)	0	3	6	9	12	15	18	21	24	27	30
Discharge (m^3/sec)	4	9	12	18	20	16	20	10	8	6	4

Assuming a constant base flow of 4 m^3/sec determine the ordinates of unit hydrograph. The catchment area is 50 km^2.

4. (a) Draw and define S-Hydro graph? How it is different from other hydro graphs. Explain base flow separation from hydro graph. **[7M]**

   (b) The ordinates of 2hr UHG are given in Table 3. Compute S-Curve and 3hr UHG for catchment area of 184.3 sq.km **[7M]**

Table 3

Time (hrs)	0	1	2	3	4	5	6	7	8	9	10
2hr UHG ordinates (cumec)	0	6	33	90	119	103	79	50	25	7	0

UNIT – III

5. (a) Define the following terms with suitable examples i) Aquifer ii)Aquiclude iii)Aquifuge iv)Aquitard **[7M]**

   (b) Design a tube well for the following data : Yield required = 0.2 cumec Thickness of confined aquifer =40 m Radius of circle of influence = 300m Permeability coefficient =80m/ day draw down= 6m **[7M]**

6. (a) Deduce the equation of yield of an open well by Recuperation test. **[7M]**

   (b) A 300 mm diameter well penetrates 25 m below the static water table. After 24 hours of pumping at 6000 litres/minute, the water table in a test well at 90 m is lowered by 0.53 m and in a well 30 m away the draw down is 1.11 m. What is transmissibility of the aquifer? **[7M]**

UNIT – IV

7. (a) Discuss the various surface irrigation methods. Indicate their limitations. **[7M]**

   (b) The root zone of irrigation soil has dry weight of 15kN/m^3 and a field capacity of 30%. The root zone depth of a certain crop having permanent wilting percentage of 8% is 0.8 m. Determine i) Depth of moisture in the root zone at field capacity ii) Depth of moisture in the root zone at permanent wilting point and iii) Depth of water available. **[7M]**

8. (a) Define consumptive use? What are the factors affecting consumptive use? Explain different methods of estimating consumptive use? **[7M]**

   (b) The gross commanded area for an irrigation canal is 30000 Hectares, out of which 75% is cultivable command area. The intensity of irrigation is 30% for ragi and 20% for paddy. If Kor period is 4 weeks for ragi and 3 weeks for paddy, determine the outlet discharge. Outlet factors for ragi and paddy may be assumed as 1800 hectares/cumec and 780 hectares/cumec. Also compute delta for each case. **[7M]**

UNIT – V

9. (a) Design the procedure for designing a irrigation channel using Lacey's theory **[7M]**

   (b) Design an irrigation channel in alluvial soil according to Lacey's silt theory, for the given data. Full supply discharge = 15m^3/sec, Lacey's silt factor = 1.0, Channel side slopes = ½:1. **[7M]**

10. (a) What is the necessity, advantages and disadvantages of lining of irrigation channels? and also mention the types of lining? **[7M]**

    (b) Mean and standard deviation from annual peak of a river covering 80 years of data are 4100 m^3/sec and 1600 m^3/sec respectively. Using Gumbel's method, calculate the return period of the flood of 9100 m^3/sec. **[7M]**

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