Code No: R31014

R10

Set No: 1

III B.Tech. I Semester Supplementary Examinations, May 2013
WATER RESOURCES ENGINEERING-I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Explain a method for testing the consistency of rainfall records at a station and necessary Adjustment   [8 M]
   (b) Define rain gauge density. Discuss the ISI norms for the rain gauge density. [7 M]

2. (a) The rates of rainfall for successive 30 min period of 210 min storm are 35, 40, 120, 85, 45, 45 and 30 mm/hr. Assuming Φ - index if 35 mm/hr, find the net rainfall in mm, the total rainfall and the volume of W-index.   [7 M]
   (b) Define Ø-index and W-index and bring out the difference between them. How is Ø-index determined from the rainfall hyetograph?   [8M]

3. (a) Explain how the following parameters affect run off
            (i) Shape of basin   (ii) Storage condition   [7 M]
   (b) Sketch a typical hydrograph resulting from an isolated storm and explain different features of it.   [8 M]

4. (a) Describe the method of estimating a T_r – year flood using Log-Pearson type III distribution.   [9 M]
   (b) What are envelope curves? How are they prepared?   [6 M]

5. (a) In an aquifer extending over 150 hectare, the water table is 20 m below ground level. Over a period of time the water table dropped to 23 below the ground level. If the porosity of an aquifer is 0.40 and specific retention is 0.15, what is the change in ground water storage of the aquifer?   [8 M]
   (b).With a neat sketch explain different types of aquifers.   [7 M]

6. (a) Define irrigation. What is the necessity of irrigation?   [7 M]
   (b) Indicate the advantages and imitations of sprinkler method of irrigation.   [8 M]

7. (a) After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop, if
      (i) Field capacity of the soil = 28 %
      (ii) Permanent wilting point = 13%
      (iii) Density of soil = 1.3 g/cm^3
      (iv) Effective depth of root zone = 70 cm
      (v) Daily consumptive use of water for the given crop = 12 mm.   [10 M]
   (b) Write short notes on:
       (i) Crop rotation (ii) Consumptive use and its estimation, (iii) Water distribution efficiency, (iv) Net irrigation requirement   [5M]
*****

1 of 2

R10

Set No: 1

8. (a) Explain Lacey's silt theory. [7 M]

(b).Using Kennedy's theory, design a channel section for the following data:

Discharge Q   = 14 cumecs
Kutter's N   = 0.0225
Critical velocity ratio m = 1
Side slopes   = ½ : 1
Bed slope   = 1/ 5000 [8 M]

*****

Code No: R31014

R10

Set No: 2

III B.Tech. I Semester Supplementary Examinations, May 2013
WATER RESOURCES ENGINEERING-I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Describe with the help of neat sketch the hydrologic cycle.   [6 M]
   (b) Write a brief note on:
         i.   Mechanism of precipitation.
         ii.   Different types of precipitation.   [9 M]

2. (a) Discuss the various factors affecting evaportanspiration.   [6 M]
   (b) Differentiate between
      (i) Potential evapotranspiration and actual evapotranspiration
       (ii) Actual infiltration rate and infiltration capacity   [9 M]

3. (a) The ordinates of a 4-h UH are given below. If there is a 4 cm effective rainfall
   occurring uniformly for 4-h, calculate the DRH resulting from the storm.

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22	24
4 h UH ordinate (cumecs)	0	9	24	50	66	72	65	53	28	20	11	6	0

[9 M]

   (b) Describe various components of runoff.   [6 M]

4. (a) What do you mean by design flood. Why is its computation so important for water
   resource projects?   [7 M]
   (b)Analysis of annual flood peaks for 50 years at a river site of Godavari basin shows
   the following relations.
     10 Yr.flood – 20,200 m^3/s
     100 Yr.flood – 38,500 m^3/s
   Estimate the magnitude of 200 Yr.flood.   [8 M]

5. (a) Derive an expression for the steady state discharge of well fully penetrating into a
   unconfined aquifer.   [7 M]
   (b) A well of diameter 20 cm fully penetrates a confined aquifer. After a long period of
   pumping at the rate of 2720 litres per minute, the observations of drawdown taken of
   10m and 100m distances from the centre of the well found to be 3 m and 0.5 m
   respectively. Find out the transmissivity of the aquifer.   [8 M]

6. (a) Explain permanent, semi permanent and portable system of sprinkler irrigation
   Methods along with neat sketches.   [8 M]
   (b) Discuss in brief the flooding methods of irrigation.   [7 M]

7. (a) What is consumptive use of water. Describe any two methods for determining the
   consumptive use of water.   [8 M]
   (b) Derive the relation between duty and delta for a given base period.   [7 M]

R10

Set No: 2

8. (a) What are the different types of canals? [8 M]
    (b) What do you mean by balancing depth of cutting. [7 M]

*****

Code No: R31014

R10

Set No: 3

III B.Tech. I Semester Supplementary Examinations, May 2013
WATER RESOURCES ENGINEERING-I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Describe the step by step procedure involved in the analysis for developing intensity frequency-duration relationships. Sketch a typical set of these curves [9 M]
   (b) What factors you consider in selecting a site for a rain-gauge station? [6M]

2. (a) Successive hourly rainfalls of 1.5, 5 and 3 cm occur over a 25 ha area consisting of 5 ha of $\phi = 4$ cm/hr, 12 ha of $\phi = 3$ cm/hr and 8 ha of $\phi = 1$ cm/hr. Derive the net rain in the successive hours. [9 M]
   (*b*) Enumerate the various water losses. [6M]

3. (a) Explain briefly the basic postulates of unit hydrograph theory [6 M]
   (b) Ordinates of a 2 hour unit hydrograph are given below. Using this derive the ordinates for a 6 hour unit hydrograph for the same catchment. [9 M]

Time (hr)	0	2	4	6	8	10	12	14	16	18	20	22
Discharge (cumec)	0	25	100	160	200	170	110	70	30	20	8	0

4. (*a*) Define 'flood routing'. What are the usual assumptions made in routing a flood in a reservoir? [7 M]
   (*b*) Explain clearly the I.S.D. curves method of reservoir flood routing. What are the factors to be considered in choosing the routing period? [8 M]

5. (*a*) Define 'transmissibility' and 'storage coefficient' of an aquifer. [6 M]
   (*b*) Calculate the discharge from a tube well of 20-cm diameter penetrating fully into a confined aquifer of 20-m thick and having a permeability of 40 m/day. The drawdown in the well is 3 m and zero drawdown at 300 m from the well. If the diameter of the well is doubled, find the percentage increase in the yield, the other conditions remaining the same. [9 M]

6. (a) Derive the expression for the time required to cover a given area by border flooding method, for a given rate of discharge and the rate of infiltration of water in the soil.[8M]
   (b) Compare surface irrigation with sub-surface irrigation [7 M]

7. (a) Explain various irrigation efficiencies [8 M]
   (b) What are the factors affecting duty? How can duty be improved? [7 M]

8. (a) Design an irrigation canal to carry a discharge of 6 Cumec. Assume N=0.225, m=1.0 and B/D=3.24. [8 M]
   (b) Briefly discuss the drawbacks of Kennedy's theory in the design of canals. [7 M]

*****

1 of 1

Code No: R31014

R10

Set No: 4

III B.Tech. I Semester Supplementary Examinations, May 2013
WATER RESOURCES ENGINEERING-I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. Find the mean precipitation for the area shown in Fig.1 below by Thiessen polygon method. The area is composed of a square plus an equilateral triangular plot of side 2 km. Rainfall readings are in cm at the various stations indicated.   [15M]
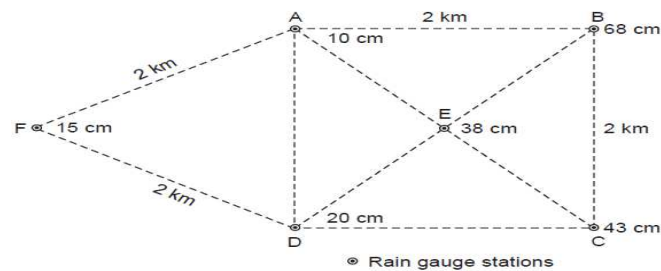

Fig 1: Rain-gauge network

2. (a) Explain various factors affecting infiltration.   [5M]
   (*b*) What are the factors, which affect infiltration? Explain any one method of determining the infiltration capacity of a soil surface.   [10 M]

3. (a) What do you understand by synthetic unit hydrograph? Explain how it is derived
   (b) What are the uses of unit hydrograph.   [10M+5M]

4. (a) Derive the Muskingum routing equation and the expression for the routing coefficients C_0, C_1, C_2.   [8 M]
   (b) A coffer dam is designed for a 25 year flood and constructed. If it takes 5 year to complete the construction of main dam, what is the risk that the coffer dam may fail before the end of the construction period? What return period in the design of coffer dam would have reduced the risk to 10%.   [7 M]

5. (a) In a certain alluvial basin of 120 km^2, 100 Mm^3 of ground water was pumped in a year and the ground water table dropped by 5 m during the year. Assuming no replenishment, estimate the specific yield of the aquifer. If the specific retention is 12%, what is the porosity of the soil?   [8 M]
   (b) Derive an expression for the steady state discharge of well fully penetrating into a confined aquifer.   [7 M]

6. (a) Describe briefly the necessity and importance of irrigation works in our country.
   (b)What are the different types of irrigation? Write brief notes on each of them.
                                                                         [7M+8M]

*****

R10

Set No: 4

7. (a) The root zone of a certain soil has a field capacity of 25 % and permanent wilting percentage is 9%.

      i. What is the depth of moisture in the root zone at field capacity and permanent wilting point?

     ii. How much water is available if the root zone depth is 1.6 m? The dry weight of the soil is 13.75 kN/m^3 [8 M]

(b) What are the factors affecting duty? How can duty be improved?   [7 M]

8. (a) Describe Lacey's theory for the design of irrigation channel in alluvial soil.   [7 M]

(b) Design an irrigation channel to carry a discharge of 7 cumec. Assume N = 0.0225 and m = 1. The channel has a bed slope of 0.25 m per kilometer.   [8 M]

*****