Total No. of printed pages = 4

19/6th Sem/DCE 612

2022

WATER RESOURCES ENGINEERING

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (a) Describe the hydrologic cycle. 10

   (b) What are the different methods available for determining mean rainfall over a catchment ? 10

2. (a) Define inconsistency in rainfall data. How inconsistency in rainfall data can be rectified ? 5+5=10

   (b) Describe the relationships among depth, area and duration for a rainfall over an area of a given duration. 10

[Turn over

3. (a) What are the different techniques available for measuring the stream flow ? How the measurement of stage of a river can be determined ? 2+8=10

(b) The following table gives the data obtained by a stream-gauging operation. The rating equation of the current meter is $v = 0.51N_s + 0.03$, m/s, where N_s = revolutions per second. Calculate the discharge in the stream : 10

Distance from left water edge (m)	0	1.0	3.0	5.0	7.0	9.0	11.0	12.0
Depth(m)	0	1.1	2.0	2.5	2.0	1.7	1.0	0
Revolutions of a current meter kept	0	39	58	112	90	45	30	0
Duration of observation (s)	0	100	100	150	150	100	100	0

4. (a) Discuss the various factors affecting the distribution of runoff. 10

(b) What is hydrograph ? Explain the different components of a flood hydrograph with the help of a sketch. 2+8=10

5. (a) The peak of flood hydrograph due to 3 hours duration isolated storm in a catchment is 270 m^3/s. the total depth of rainfall is 5.9 cm. assuming an average infiltration loss of 0.3 cm/hour. and constant base flow of 20 m^3/s; estimate the peak 3-hrs unit hydrograph of the catchment. If the area of catchment is 567 km^2 then determine the base width of 3-hours unit hydrograph by assuming it to be triangular in shape. 10

(b) What are the assumptions made in the Unit Hydrograph Theory ? Describe the method of deriving a new Unit Hydrograph from isolated storms. 3+7=10

6. (a) What are the sources of ground water flow ? What is the difference between infiltration and percolation ? 2+3=5

(b) Describe briefly how the water table changes in different conditions. 5

(c) Describe the different aquifer properties. 10

7. Write short notes on any *two* of the following : 10×2=20

(a) Evapotranspiration

(b) Probable maximum rainfall

(c) Darcy's Law

(d) Unit hydrograph.