Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth semester B.Tech degree examinations (S) September 2020

Course Code: CE309
Course Name: WATER RESOURCES ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions, each question carries 15 marks.   Marks

1 a) Explain the method of determination of optimum number of raingauges in a catchment (4)

   b) Compare Thiessen polygon method and isohyetal method for determination of average precipitation over a catchment (6)

   c) Explain rainfall mass curve and hyetograph. How will you construct a hyetograph from rainfall mass curve (5)

2 a) A trapezoidal channel of bed width 4 m and side slope 1 : 1 carries water at a depth of 2 m. The rate of evaporation observed was 0.35 mm/m^2/h. Find the daily loss due to evaporation from the canal in a length of 10 km in ha m. (5)

   b) Explain the factors affecting runoff from a catchment (10)

3 a) Enlist the uses and limitations of unit hydrograph theory (5)

   b) Given below are the ordinates of 4 hr UH of a basin. Derive 2 hr UH of the basin using S-curve method (10)

Time (hrs)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
UHO (m^3/sec)	0	20	36	60	80	112	120	105	92	40	24	14	9	7	0

PART B
Answer any two full questions, each question carries 15 marks.

4 a) Define Duty and Delta. Obtain the relation between the two (5)

   b) A canal was designed to supply the irrigation needs of 1000 ha of land growing rice of 120 days base period and having a delta of 130 cm. Instead of rice if the canal water is used entirely to irrigate wheat of base period 118 days and having delta of 50 cm, determine the area that can be irrigated by the canal supplies. (10)

5 a) Explain irrigation efficiencies. (5)

   b) Explain benefits and ill effects of irrigation. (4)

c) Explain (i) field capacity (ii) permanent wilting point (iii) capillary water (6)

6 a) Explain the classification of river training. (3)

b) The data pertaining to a stream gauging operation at a gauging station are given below. The rating equation of the current meter is $v = 0.51 N_s + 0.03$ m/sec where N_s is the number of revolutions per second. Calculate the discharge in the stream. (12)

Distance from left water edge (m)	0	1	3	5	7	9	11	12
Depth (m)	0	1.1	2	2.5	2	1.7	1	0
Revolutions of current meter kept at 0.6 depth	0	39	58	112	90	45	30	0
Duration of observation (s)	0	100	100	150	150	100	100	0

PART C
Answer any two full questions, each carries 20 marks.

7 a) Define safe yield and average yield of reservoirs. (4)

b) Explain the method of determination of yield of reservoirs with a given capacity. (4)

c) A reservoir has a capacity of 3.6 Mha-m upto the level of the spillway crest. The average annual inflow is 1.5 Mha-m of water. If the average annual sediment inflow is 3×10^{11} kg, determine the useful life of the reservoir assuming that the usefulness of the reservoir is terminated when 2/3 of the total capacity is filled with sediments. Assume suitable value for specific weight of sediment. (12)

C/I Ratio	2.4	2	1.6	1.2	0.8	0.4
Trap Efficiency	98.2	98	97.5	97	96	95

8 a) Stating the assumptions underlying it, derive the Dupuit's equation for steady radial flow into unconfined aquifers. (10)

b) During a recuperation test conducted on an open well in a region, the water level in the well was depressed by 3 m and it was observed to rise by 1.75 m in 90 minutes. (a) What is the specific yield of open wells in that region (b) What will be the yield from a well of 5 m diameter under a depression head of 2.5 m? (10)

9 a) Describe the vertical distribution of ground water. (5)

b) Differentiate (i) open well and tube well (ii) flowing well and artesian well (6)

c) A 30 cm diameter well completely penetrates a confined aquifer of permeability of 45 m/day. The length of the strainer is 20 m. Under steady state of pumping, the drawdown at the well was found to be 3 m, and the radius of influence was 300 m. Calculate the discharge. If the diameter of well is increased by 50 %, what will be the percentage increase in discharge? (9)

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