

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018**

**Course Code: CE309**

**Course Name: WATER RESOURCES ENGINEERING (CE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks*

Marks

- 1 a) Explain the components in a hydrological cycle with a neat sketch. (5)
- b) How can you obtain the optimum number of rain gauges in a catchment area? (5)
- c) Differentiate mass curve and hyetograph. (5)
- 2 a) Explain the methods to find the average precipitation over a catchment area. (6)
- b) The isohyets for annual rainfall over a catchment were drawn and areas of strips between isohyets are obtained as below. Determine the average depth of annual rainfall over the area. (5)

Isohyets(mm)	450-550	550-650	650-750	750-950	950-1150	1150-1250
Area (km <sup>2</sup> )	1200	3000	2800	1000	900	600

- c) Define infiltration indices. (4)
- 3 a) List and explain factors affecting runoff in a catchment area. (5)
- b) What is unit hydrograph? Stating the assumptions, explain the derivation of a unit hydrograph from a storm hydrograph. (5)
- c) Ordinates of 2 hour unit hydrograph are given below. Using this derive the ordinates of a 6 hour unit hydrograph using S hydrograph method. (5)

Time (hrs)	0	2	4	6	8	10	12	14	16	18	20	22
Ordinate of 2 hour unit hydrograph (cumec)	0	25	100	160	200	170	110	70	30	20	8	0

**PART B**

*Answer any two full questions, each carries 15 marks*

- 4 a) Write the environmental effects of irrigation. (4)
- b) Differentiate between flow and lift irrigation systems. (4)
- c) Gross command of a reservoir is 50,000 hectares. The CCA is 80% of GCA. Find out the capacity of the reservoir which is able to irrigate areas as given below. Reservoir and canal losses may be taken as 5% each of water required by crops. (7)

Crop	Base period (days)	Duty (hectares/cumec)	Intensity of irrigation as % of CCA
Wheat	120	2000	25
Rice	140	900	18.75
Cotton	180	1600	12.50

- 5 a) Define field capacity, permanent wilting point and available moisture. (4)
- b) A loam soil has field capacity 27% and permanent wilting percentage 12%. The dry weight of the soil is 13.73 kN/m<sup>3</sup>. If the depth of the rootzone is 1 m, determine the storage capacity of the soil. Irrigation water is applied when the (6)

moisture content drops to 15%. If the water application efficiency is 75%, determine the water depth require to be applied in the field.

- c) Define duty and delta. Derive the relation between them. (5)
- 6 a) What is river training? What are the objectives of river training? What are the classifications? (8)
- b) Explain Guide banks and groynes with neat sketches. (7)

### PART C

*Answer any two full questions, each carries 20 marks*

- 7 a) What are the storage zones in a reservoir? (5)
- b) Define trap efficiency. Explain the method to find useful life of a reservoir. (10)
- c) Differentiate mass curve and demand curve. (5)
- 8 a) Define porosity, specific yield and specific retention. Establish a relation between them. (5)
- b) Explain and derive steady state flow to wells in a confined aquifer. (10)
- c) Explain Darcy's law. (5)
- 9 a) Explain recuperation method to find yield from an open well. (5)
- b) A well is to be constructed in a fine sandy subsoil formation. The discharge of the well is anticipated to be  $0.004 \text{ m}^3/\text{s}$  under depression head of 4 m. Find the diameter of the well. Given  $(K/A)$  for sandy soil =  $0.5 \text{ m}^3/\text{hr}/\text{m}^2$  of area under depression head of 1 m. (8)
- c) Explain with sketch strainer type tube well. (7)

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