R22 Regulation *Subject code: 4E5AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Supplementary Examinations, April 2026

WATER RESOURCES ENGINEERING-I

(CE)

Maximum Marks: 60 Date:15.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	What are the factors affecting runoff over a catchment.	1M	1	L1
b)	What do mean by infiltration indices?	1M	1	L2
c)	State how S-curve is constructed and when it is adopted.	1M	2	L2
d)	Distinguish between runoff and stream flow.	1M	2	L1
e)	What would the advantages of having a 1hr Unit Hydrograph?	1M	3	L2
f)	State Darcy's law and give its limitations.	1M	3	L1
g)	What is the relation between depth and frequency of irrigation.	1M	4	L1
h)	Define ill effects of irrigation	1M	4	L2
i)	How to formulate catchment area?	1M	5	L2
j)	Differentiate between contour canal and ridge canal	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Explain the various components of hydrological cycle with help of a sketch. b) Explain the method of determination of optimum number of rain gauges in a catchment	5M 5M	1 1	L3 L2
	OR			
3	a) Differentiate between evaporation, transpiration, evapo-transpiration and actual evapo-transpiration. b) Determine optimum number of rain gauges in catchment area from following data. No. of existing rain gauge = 7 Mean annual rain fall at the gauges are 1010, 980,900,870, 850, 800, 700 mm. Permissible error = 8 %.	4M 6M	1 1	L2 L3
4	a) List and explain various factors effecting Runoff. b) The peak of a flood hydrograph due to a 6hour storm is 675cumecs. The average depth of rainfall is 9.75cm. Assume an infiltration loss of 0.75cm/hr and a constant base flow of 20cumecs. Estimate the peak discharge of a 6hr unit hydrograph for the catchment.	4M 6M	2 2	L3 L3
	OR			

5	a) What is hydrograph? Explain the factors affecting the hydrograph. b) List and explain various methods of base flow separation.	6M 4M	2 2	L3 L3
6	a) Explain the importance of transmissivity and storage coefficient. b) The elevation of water table in an unconfined aquifer at two locations separated by a distance of 100 metres is 500m and 625m respectively. If the hydraulic conductivity of the aquifer is 18m/day and porosity 25%. Find the actual velocity of flow in the aquifer.	5M 5M	3 3	L4 L4
	OR			
7	a) With help of sketches explain the confined, semi-confined, unconfined and perched aquifers. b) A fully penetrating artesian well is pumping @ 1500 m3/day from an aquifer whose storage coefficient and transmissivity are 4×10-4 and 0.145 m2/min respectively. Find the drawdowns at a distance 3m from the production well after 1 hour of pumping and a distance of 350m after 1 day of pumping.	5M 5M	3 3	L4 L4
8	a) Derive the equation to determine the relationship between duty, delta and base period. b) What are the advantages, disadvantages and limitations of Furrow Irrigation and check basin methods of Irrigation?	5M 5M	4 4	L4 L4
	OR			
9	a) Define frequency of irrigation and factors affecting the frequency of irrigation. b) What is border irrigation and explain in details its application?	5M 5M	4 4	L4 L4
10	a) Discuss causes of water logging. What are the remedial measures for it? b) Design an irrigation channel in alluvial soil according to Lacey's theory with full supply discharge as 15cumecs, f = 1.0, channel side slopes as 1.5:1.	5M 5M	5 5	L5 L5
	OR			
11	a) State the drawbacks of Kennedy's theory. Design a canal section using Kennedy's theory to carry a discharge of 56 cumecs. Assume N=0.0025, m=1 and B/D ratio as 6. b) Discuss the precautions to be considered for canal alignments.	6M 4M	5 5	L5 L5