R22 Regulation Subject code:*4E6EC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

MACHINE LEARNING

(CSE)

Maximum Marks: 60 Date:18.04.2026 Duration: 3 hours

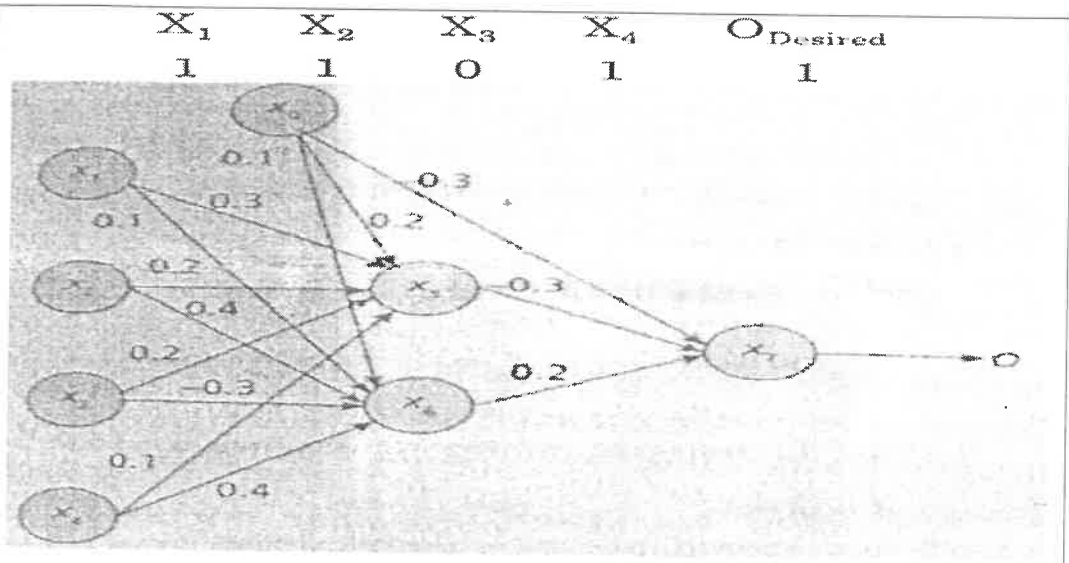
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10×1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	What is Linear Separability?	1M	CO1	L2
b)	What is a Hypothesis Space?	1M	CO1	L1
c)	What is Radial Basis Function (RBF)?	1M	CO2	L1
d)	Define Error Function.	1M	CO2	L1
e)	Define Boosting.	1M	CO3	L1
f)	What is Classification Tree?	1M	CO3	L2
g)	What is Independent Component Analysis (ICA)?	1M	CO4	L3
h)	Define Genetic Algorithm.	1M	CO4	L2
i)	Define Bayesian Networks.	1M	CO5	L2
j)	What is Hidden Markov Model?	1M	CO5	L1

Part-B

Answer All the following questions. (5×10M=50Marks)		Marks	CO	Bloom Tx
2	a) Describe the structure of a biological neuron and artificial neuron? b) Explain the Concept Learning task?	6M 4M	CO1	L1
	OR			
3	Analyze the working of the Perceptron algorithm for linearly separable data.	10M	CO1	L3
4	Perform a feedforward operation in a Multi-layer perceptron (MLP) and conclude the result. This given MLP consists of an Input, one hidden, and an Output layer. The input layer has 4 neurons, the hidden layers has 2 neurons, the output layer has a single neuron, and the learning rate is 0.8.	10M	CO2	L3

				
	OR			
5	Derive the Backpropagation rule considering the training rule for Output Unit weights and Training Rule for Hidden Unit weights.	10M	CO2	L3
6	Cluster the following data using k-means algorithm with an initial value of objects 2 and 5 with the coordinate values (4,6) and (12,4) as initial seeds. Objects | X-Coordinate | Y-Coordinate 1 | 2 | 4 2 | 4 | 6 3 | 6 | 8 4 | 10 | 4 5 | 12 | 4	10M	CO3	L3
	OR			
7	Explain Ensemble Learning techniques.	10M	CO3	L2
8	Define Genetic Algorithm. Demonstrate the working of Genetic Algorithm in optimization problems.	10M	CO4	L3
	OR			
9	What is Principal Component Analysis (PCA)? Explain the need for dimensionality reduction in Machine Learning.	10M	CO4	L2
10	a) Explain Markov Chain Monte Carlo methods. b) What is Hidden Markov Model?	5M 5M	CO5	L1
	OR			
11	Design a Reinforcement Learning model for autonomous agents.	10M	CO5	L3