



R22 Regulation

Subject code: 4E6FA

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

**B.Tech VI Semester Supplementary Examinations, November 2025**

**MACHINE LEARNING**

(IT)

Maximum Marks: 60

Date: 11.11.2025

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	Bloom Tx
1.a)	Name one real-world application of reinforcement learning.	1M	CO1	1
b)	What is the main goal of the Candidate Elimination algorithm?	1M	CO1	1
c)	What is the role of the hidden layer in a Multi-layer Perceptron (MLP)?	1M	CO2	1
d)	How does forward propagation in a neural network differ from back propagation?	1M	CO2	2
e)	What is the main difference between classification and regression trees?	1M	CO3	2
f)	What is the primary characteristic of unsupervised learning?	1M	CO3	1
g)	What type of problems are Genetic Algorithms particularly useful for?	1M	CO4	1
h)	What is the basic concept behind the concept of genetic offspring in Genetic Algorithms?	1M	CO4	1
i)	How do Hidden Markov Models (HMM) represent sequences of data?	1M	CO5	1
j)	What is the role of a Markov Chain in MCMC methods?	1M	CO5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Explain the concept of version spaces and the Candidate Elimination algorithm. How does the Candidate Elimination algorithm help in narrowing down the hypotheses space in the process of learning a concept?	10M	CO1	3
OR				
3	Define linear regression in the context of machine learning. How is the model built, and how do we estimate the parameters (weights)? What is the significance of the Mean Squared Error (MSE) cost function?	10M	CO1	2
4	Explain the concept of the Curse of Dimensionality. How does it affect the performance of machine learning models, especially in high-dimensional data? Discuss techniques to mitigate this issue.	10M	CO2	3
OR				
5	Describe the steps involved in training a Multi-layer Perceptron (MLP) using back propagation with example. Discuss the importance of	10M	CO2	3

	choosing the right learning rate and activation function in improving the model's performance.			
6	Explain the steps in k-means algorithm. Cluster the following dataset of 8 objects into 2 clusters using Euclidean distance function: A1(2,10), A2(2,5), A3(8,4), A4(5,8), A5(7,5), A6(6,4), A7(1,2), A8(4,9).	10M	CO3	4
	OR			
7	What is Gaussian Mixture Models (GMM)? How do GMMs work for clustering tasks, and how do they differ from k-means clustering? Discuss the advantages and disadvantages of using GMMs.	10M	CO3	2
8	Explain the concept of Genetic Algorithms (GA). Discuss how selection, crossover, and mutation work together to evolve a solution. Provide an example of a problem that can be solved using a genetic algorithm.	10M	CO4	3
	OR			
9	Discuss the concept of evolutionary learning and how Genetic Algorithms can be used for optimization problems. Provide a detailed example of how GAs can be applied to hyper parameter tuning in machine learning.	10M	CO4	3
10	Explain the structure and working of a Hidden Markov Model (HMM). How are HMMs used for sequential data and what are their common applications?	10M	CO5	2
	OR			
11	Discuss the concept of Tracking in machine learning. Explain how tracking methods like Kalman filters and particle filters are used for estimating the state of moving objects over time.	10M	CO5	3