Reg. No. | | | | | | | | | | | | |

M.E / M.TECH. DEGREE EXAMINATIONS, MAY 2024
Second Semester
CF22005 - MACHINE LEARNING TECHNIQUES
(Information Technology)
(Regulation 2022)

TIME: 3 HOURS   **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Distinguish between, supervised, unsupervised and semi-supervised learning.	4
CO 2	Apply the apt machine learning strategy for any given problem.	3
CO 3	Suggest supervised, unsupervised or semi-supervised learning algorithms for given problem.	5
CO 4	Design systems that uses the appropriate graph models of machine learning.	6

PART- A (20 x 2 = 40 Marks)
(Answer all Questions)

		CO	RBT LEVEL
1.	Characterize supervised and unsupervised learning with example.	1	2
2.	Investigate on the properties of biological and artificial neuron.	2	3
3.	Brief about the significance of perceptron convergence theorem.	2	2
4.	Compare classification and regression models.	1	4
5.	Write the use of radial basis function network.	2	2
6.	Find the derivative of sigmoid function.	2	3
7.	Examine the challenges of Artificial neuron network.	2	3
8.	Compare multi layer NN and RBF NN.	1	4
9.	How Bayes theorem calculates posterior probability?	1	3
10.	Write the ada boast algorithm for boosting.	1	2
11.	How does ensemble of classifiers improve the accuracy of classification systems?	3	4
12.	List the advantage of bagging over boosting.	3	2
13.	Compare LDA and IDA	3	4
14.	Justify the need for dimensionality reduction in the context of ML.	3	4
15.	State the three Methods to generate offspring.	3	2
16.	What is meant by isomap? Give its significance in ML.	4	2
17.	Construct a Bayesian network simulating a teacher entering and leave class.	4	3
18.	List the applications of Markov random fields.	4	2
19.	What is the principle involved in hidden Markov models?	4	4

| 20. | Ascertain the functionality of Gibbs sampler . | | 4 | 3 |

PART- B (5 x 10 = 50 Marks)

| | | Marks | CO | RBT LEVEL |

21.(a) Discuss the candidate elimination algorithm and suggest alternate hypothesis for the given problem. **(10)** 4 2

Example No	Size	Color	Shape	Ball
H1	Small	Red	Circle	Yes
H2	Big	Red	Triangle	No
H3	Small	Blue	Circle	Yes
H4	Big	Red	Circle	Yes

(OR)

(b) Using Find –S algorithm find the hypothesis to figure out if a person is covid positive or not using the data given below with. **(10)** 4 2

Sl.No	Breathing Difficulty	Cough	Fever	Covid
1	Yes	Yes	Yes	Positive
2	Yes	Yes	No	Positive
3	Yes	No	Yes	Negative
4	No	Yes	Yes	Negative
5	No	No	Yes	Negative
6	No	No	No	Negative

22.(a) Draw the model and explain the algorithm for back propagation. Derive necessary equations to depict the back propagation error. **(10)** 1 3

(OR)

(b) Solve the XOR problem using Radial Basis Function Network with center (0, 1) and (1,1) and variance 0.5. w1=-0.5,w2=0.4,w0=0.4 . **(10)** 1 3

23.(a) Construct a decision tree using CART algorithm and classify the students in a class based on their academic performance. **(10)** 2 3

(OR)

(b) How is bayes theorem used in machine learning? How naïve bayes **(10)** 2 3

algorithm is different from bayes theorem.

			Marks	CO	RBT LEVEL
24.(a)	Describe how principal component analysis is carried out to reduce the dimensionality of data sets.		(10)	4	4
	(OR)				
(b)	Interpret the process of Q-learning and discuss the following terms: (i) Q-values or action value (ii) Rewards and Episode (iii) Temporal difference or TD update.		(10)	4	4
25.(a)	Discuss Markov chain Monte Carlo methods in detail.		(10)	3	4
	(OR)				
(b)	Analyze inference in Bayesian Networks with an example.		(10)	3	4

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Using genetic algorithm maximize $f(x) = x^3$ over $\{0, 1, 2...31\}$ with the initial x values of $\{12, 25, 5, 19\}$. Show one crossover and mutation operations. Assume the crossover mask of 2. Mutation pattern $\{10000, 01000, 00100, 00010, 00001\}$	(10)	3	5

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