Seat No.: _____   Enrollment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3171617   **Date:15-05-2024**
Subject Name: Applied Machine Learning
Time:02:30 PM TO 05:00 PM   **Total Marks:70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Classify following into correct learning task: (Supervised learning, Unsupervised learning, Reinforcement learning)	**03**
		I. Self-driving cars. II. Predict the price of a stock in 6 months from now, on the basis of company performance measures and economic data. III. Grouping documents into different categories based on their topics.	
	(b)	Differentiate between human learning and machine learning.	**04**
	(c)	Answer in brief:(Strictly in less than 50 words) i. Define cross validation ii. Explain the role of statistical tools in machine learning. iii. Discuss Bias–Variance Tradeoff.	**07**
Q.2	**(a)**	Briefly explain the concept of Bayes' theorem using the terms "prior probability," "likelihood," and "posterior probability."	**03**
	(b)	Having the network/graph shown in figure below, decide on the validity of following statements:	**04**
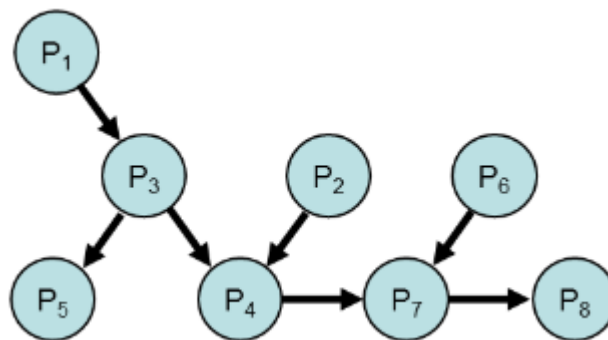
i) $P_1, P_5 \perp\!\!\!\perp P_6 | P_8$

ii) $P_2 \perp\!\!\!\perp P_6 | \emptyset$

iii) $P_1 \perp\!\!\!\perp P_2 | P_8$

iv) $P_1 \perp\!\!\!\perp P_2, P_5 | P_4$

Where $\perp\!\!\!\perp$ indicates conditional independence, $\emptyset$ is null set

	(c)	Explain Naïve Bayes classifier with an example of its use in practical life.	**07**

OR

	(c)	Explain the concept of a Bayesian Belief Network (BN). How does it represent knowledge and perform inference compared to a simpler Naive Bayes classifier? Discuss the advantages and disadvantages of using Belief Networks.	**07**

Q.3	**(a)**	What are the advantages of the kNN algorithm?	**03**
	(b)	Briefly explain the concept of logistic regression. How does it differ from linear regression in terms of the predicted output?	**04**
	(c)	Explain Support vector machine (SVM) on following points: i. Support Vector. ii. Maximum margin hyperplane. iii. Kernel tricks.	**07**

OR

Q.3	**(a)**	Define information gain in a decision tree.	**03**
	(b)	Distinguish between linear regression and multivariate regression.	**04**
	(c)	Discuss the random forest model in detail. What are the features of random forest?	**07**

Q.4	**(a)**	Briefly describe the basic structure and working principle of an artificial neural network.	**03**
	(b)	Distinguish between Perceptron and Linear SVM?	**04**
	(c)	Explain the concept of backpropagation and its role in training neural networks.	**07**

OR

Q.4	**(a)**	Briefly explain the key differences between traditional neural networks and deep learning models.	**03**
	(b)	Discuss the role of Convolutional Layers in Convolutional Neural Network (CNN)?	**04**
	(c)	What is a Recurrent Neural Network (RNN)? How RNN differs from Feedforward Neural Network?	**07**

Q.5	**(a)**	Enlist Advantages of Generative Adversarial Network (GAN)?	**03**
	(b)	Differentiate between Machine Learning and Deep Learning	**04**
	(c)	Discuss the strengths and weaknesses of the k-means algorithm.	**07**

OR

Q.5	**(a)**	What is Adversarial Machine Learning?	**03**
	(b)	Explain ordinary least square with formula.	**04**
	(c)	Discuss maximum likelihood estimation in detail.	**07**

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